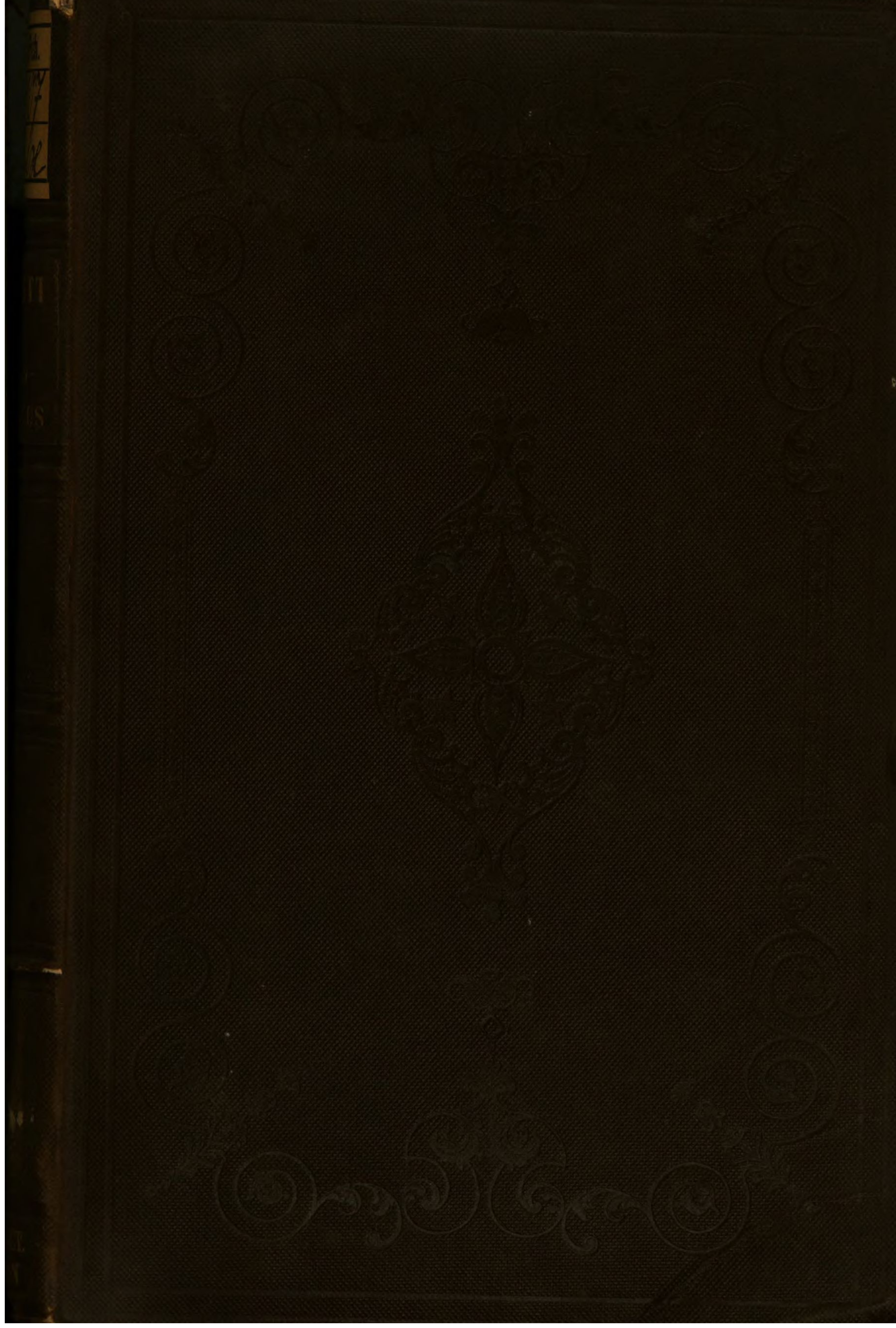




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Bennett

THE CAUSES,
NATURE, DIAGNOSIS, AND TREATMENT
OF
ACUTE HYDROCEPHALUS;
OR,
WATER IN THE HEAD.

A PRIZE ESSAY,
TO WHICH THE MEDICAL SOCIETY OF LONDON
AWARDED
THE FOTHERGILLIAN GOLD MEDAL
FOR 1842.

BY
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" Multa infantum millia letho dedit."—SYDENHAM.

LONDON:
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1843.

BIBLIOTHECA
REGIA
MONACENSIS.



TO THE
PRESIDENT, OFFICERS, AND FELLOWS
OF THE
MEDICAL SOCIETY OF LONDON,

IN TESTIMONY OF HIS RESPECT AND ESTEEM,

THIS ESSAY IS INSCRIBED

BY THEIR

OBLIGED FRIEND AND ASSOCIATE,

THE AUTHOR.

PATRI DILECTISSIMO,
JACOBO BENNETT, S.T.P.,
VIRO PRÆCLARO,
LITERARUM ET SACRARUM ET HUMANARUM ÆQUE PERITO,
HOC OPUSCULUM, QUALECUNQUE SIT,
ADMIRATIONIS, PIETATIS,
NECNON
ANIMI OB MULTA MAXIMAQUE BENEFICIA GRATI,
MONIMENTUM ESSE VULT
FILIUS AMANTISSIMUS.

P R E F A C E.

HAVING been, for some years past, physician to a large public institution, it has fallen to my lot to see much of the diseases of children, especially those of the poor. The opinions advanced in the following pages are the results of investigation and study which have thus been forced on me by the frequent observation of a very fatal disease.

When, therefore, the Medical Society of London, in fulfilment of the important trust confided to them by the distinguished Dr. Lettsom, advertised the title of the present work for the Fothergillian Prize Essay of 1842, I resolved to review the whole subject of Hydrocephalus; for I had long been convinced, both from intercourse with those who are entering the profession, as well as from my own past experience, that either very vague and uncertain, or altogether erroneous impressions, were frequently entertained of the nature and treatment of the various diseases to which the term Hydrocephalus is applied.

This Essay is now given to the profession; not so much because it has been adjudged worthy of the Fothergillian Medal, as because, in the estimation of some, whose opinions ought to be valued, it is calculated to excite attention to important facts, to remove some obscurities and misconceptions, and thus, perhaps, to prove useful to the public.

That some of the opinions, both pathological and therapeutical, advanced in the following pages, are open to criticism, I am fully aware. Facts, however, have not been willingly perverted, nor have any opinions been stated excepting such as appear to derive support from observation and practice.

If, however, I should have succeeded only in exposing to view more clearly and fully the whole subject of Acute Hydrocephalus, and in exciting other observers to further consideration and investigation of the more important questions discussed in the present Essay, its publication will be amply justified.

24, Finsbury-place North,
Finsbury-square.

Feb. 15th, 1843.

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“ La collection d'eau dans le crâne et dans le cerveau, est l'effet de diverses causes qu'il faut connoître pour les combattre, et pour les prévenir s'il est possible ; car quel remède seroit assez efficace, pour guérir les hydropisies du cerveau, quand indépendamment de l'eau qui inonde ce viscère, il est désorganisé dans sa substance ? ”

Portal, Anat. Méd. iv. 76.

AN ESSAY
ON
ACUTE HYDROCEPHALUS.

CHAPTER I.

General characters of the different varieties of the Disease.—
Progress and order of succession of the Symptoms.

INTRODUCTORY REMARKS.

A SLIGHT glance at the Bills of Mortality will shew how fatal, and therefore how important, is the disease which forms the subject of the present essay; whilst the terror excited in the minds of parents by its very name, and the anxiety with which its slightest symptoms are regarded by the medical practitioner, evince the imperfection and uncertainty of the control exercised over it by the most skilfully directed remedial efforts. That the present imperfect state of our knowledge, regarding either the true nature or treatment of the disease, has not, however, arisen from want of attention and investigation by the profession, commensurate with

the importance of the subject, the records of medicine sufficiently prove. The difficulties which confessedly attend the investigation of the subject do not arise from one source alone; their nature and variety are such as can be duly appreciated and met only by those who can bring to the careful unprejudiced observation of the disease, at the bedside, a mind well versed in physiological and pathological science. It is not, in fact, till the disease has been thoroughly investigated, that the nature, variety, and importance of the difficulties are duly estimated.

A slight acquaintance, however, with the subject will be sufficient to shew that much of the difficulty has arisen, as in too many other instances, from the employment of a particular name. It is manifest that, if, on the one hand, we employ a particular name to denote a certain condition or effect of disease, that name is inapplicable, and ought not to be employed, unless that condition or effect can be proved to exist; and if, on the other hand, it be used to denote a class or series of symptoms, it should be such as will convey to the mind some definite idea of the general character of those symptoms, and not such as implies the existence of something with which they are but occasionally and accidentally associated. If, therefore, we employ the term *Hydrocephalus*, in accordance with its strict etymology, to denote the existence of water in the head, we must comprise under this

title a vast number of diseases, universally admitted to be very different in their nature, and many of them having nothing at all in common, except the presence, during some part of their course, of this watery effusion within the head. We should thus be raising to the rank of an independent disease (and one possessing a wondrously proteiform character) what is, in fact, nothing but a concomitant, or effect, of a great many distinct diseases. But if, on the contrary, we make use of the term Hydrocephalus to denote a particular train of symptoms, which are generally accompanied, or followed, by effusion of water within the head, then we have, in strict propriety, no right to refuse the designation to any particular case in which these symptoms have been present, simply because there is no evidence, after death, of the existence of any effusion. Now, I think it may be very readily shewn, and indeed would be generally admitted, that, if we are to employ the phrase "Acute Hydrocephalus" in this latter mode, we are equally compelled to include in it affections differing considerably both in their pathology and in the treatment they require. It may, indeed, be assumed, that the very general admission by the profession, that identical or closely similar trains of symptoms may attend very different states of the encephalon and of the system at large, has been one of the reasons that have led to the proposal of the subject of the present essay. This, however, it may be said, is predetermining the ques-

tion *sub judice*: but of this it is almost impossible for a writer to avoid the appearance, however desirous he may be of entering on the consideration of the subject in the most unprejudiced manner.

I shall, therefore, assume for the present, that it is agreed to call certain associations of symptoms, indicating disease within the head which runs an acute course, by the name of "Hydrocephalus acutus;" and my first object will be, briefly to describe these symptoms, their usual course and termination. Nor do I anticipate much objection on the part of practical men to these descriptions of symptoms, which it is assumed all would agree to call Hydrocephalus, irrespective of any consideration of their cause, nature, or mode of treatment; for, although these trains of symptoms vary greatly in their character and order of succession (no two cases of disease being exactly alike), and although it would be impossible to describe all the modifications which present themselves, there are certain classes of symptoms, alike in their general features, which are familiar to all practical men, and which, in consequence of this general resemblance, have received a common designation.

The history and progress of the symptoms of the most characteristic form of Acute Hydrocephalus as given by Whytt, to whom must be awarded the praise of having first distinctly described the disease, are so accurate and complete, that, it is affirmed, little of importance has been added to

his account; and it would perhaps have been fortunate had we followed the example of many of the German writers, and designated the disease by the name of its first accurate historian. Of all those, however, who have written on Hydrocephalus since Whytt, there is perhaps no one who has better described its more usual forms than Gölis. To him, however, it has indeed been objected, that he has described only certain forms or species, and that there are others under which the disease often presents itself, which it is important in a practical point of view to distinguish from those which he has described. But, though there is much foundation for this objection, in the early stages the disease presents infinite varieties which it would be impossible to describe; whilst when fully developed, so as to be satisfactorily recognised, most cases may be referred to one or other of the forms described by Gölis. In the latter stages the uniformity of the symptoms, in almost all cases, is striking. Gölis, however, has not noticed an important form of the disease with which practical men in the present day are familiar. The *ordinary* characters of the disease have been well delineated by Drs. Cheyne, Carmichael Smyth, and Quin in this country; and by Hopfengärtner, Formey, Coindet, Charpentier, and Breschet on the Continent, as well as by many others.

A tolerably complete view of the various forms

under which the disease presents itself has been given by Dr. Abercrombie, by means of an admirably selected series of examples. The best means, undoubtedly, of becoming acquainted with any disease is carefully to study the varieties presented by individual examples. On the present occasion, however, it seems desirable to sketch, in the first place, the general outlines of the picture, which in nature we find variously filled up.

Feverishness, with more or less headache; increased susceptibility of the organs of sense to their natural stimuli, particularly of the eye and ear, as evinced by impatience of light, contracted brow, and starting at the slightest sound; symptoms of uneasiness when the head assumes the erect posture, constipation of the bowels and vomiting, screaming or moaning, dilated pupils and squinting, irregular intermitting pulse, and death preceded by more or less complete coma, or convulsions and palsy; constitute the usual train of symptoms designated Acute Hydrocephalus.

There is considerable variety in the degree of acuteness with which the foregoing symptoms set in. Sometimes they are developed in a manner so rapid and even sudden, that only a few hours elapse between a state of apparently perfect health and the fully formed disease: but at other times, their accession is more gradual, and insidious; and particular symptoms may be present, as harbingers of the approach of the foe,

some time before we can be sure of the form it will assume. In a large majority of instances, however, it is preceded by certain *premonitory symptoms*, which it is of the last importance to detect.

PREMONITORY SYMPTOMS.

It is unnecessary here to inquire which of the many precursory symptoms observed are primary, and referable to the brain directly, and which secondary, or symptomatic of derangement in other organs. My present object is to point out the more striking of those phænomena which indicate a state of system generally, or of the brain in particular, that frequently terminates in Acute Hydrocephalus. The most frequent and the most striking of these symptoms are undoubtedly referable to the digestive system, though usually such as are common to many of the ailments of children, and cannot be considered as characteristic of incipient cerebral disease. The tongue is more or less coated with a whitish fur, through which the papillæ often protrude; the bowels are costive, or very irregular; the motions offensive, and for the most part deficient in bile, or indicative of an unhealthy state of that secretion; the abdomen is tumid, and frequently tender, particularly over the hypochondria; the urine is deficient in quantity, and turbid. The appetite is defective, or variable and capricious.

The skin loses its healthy appearance, and is faded and harsh. The face has a languid sunken aspect, and the inferior palpebræ are frequently surrounded by a dark line.

Associated with the above symptoms, and generally the earliest directly referable to the brain, is a change in the natural habits and disposition of the child: it is either merely dull and out of spirits, indisposed to play, and takes no interest in those things that have hitherto pleased it; or it is peevish, fretful, irritable, and frightened at trifling causes. If sufficiently old to go to school, or its intellectual faculties be considerably developed, it is no longer equal to their ordinary exercise, and is evidently unable to read, or keep up its usual attention. In several instances that have fallen under my own observation, the first intimation the parents have had of the children not being in their ordinary health, has been their complaining, after leaving school for the day, of the noise of the school hurting their heads and their being unequal to the duties of school. On lying down for a while, they recover their spirits and join their companions in their sports, which, however, they are sure soon to quit. If more particular inquiries be now made, it will be found that the sleep is broken and disturbed by dreams, though perhaps the disposition to sleep is increased; and often, when not asleep, the child falls into a reverie betokened by a fixed, grave, and thoughtful aspect. If asked whe-

ther it be in pain, it will perhaps reply in the negative, or make some indistinct reference to the head. The child moves in a listless languid manner, sighs frequently, and appears dejected. Another symptom, referable to the nervous system, is of frequent occurrence in the earliest periods of the disease; occasional pains of a rheumatic character in different parts of the body, particularly about the abdomen and in the inferior extremities. This is a symptom which is very apt to mislead, particularly if the pains be seated in those parts where they readily receive their explanation by reference to those organs which are manifestly deranged. I have more than once been deceived by such abdominal pains in more chronic cases, associated with a tumid belly and deranged bowels.

Occasional voluntary complaints of pain in the head, of noise, giddiness or confusion, generally mark the near approach of the disease in a less questionable shape. Vertigo is, however, sometimes noticed for a considerable time before the malady is fully developed, and in very young children is often denoted by sudden silence in the midst of a cry, the head being at the same time flung back, or on one side. The gait of the little sufferer is often unsteady; and Gölis remarks, that, "in stepping forward, they raise the foot as if they were stepping over a threshold, they totter and stagger as if drunk." These latter symptoms are by Gölis referred to a state of turgescence of the vessels of

the brain; but if by this term is implied a state of vessels attended by over-action, there is great reason to doubt whether the explanation be in many instances correct. During this precursory stage the pulse varies much: often it is not quickened, nor indeed deviates much from the healthy state. In other instances, on careful observation, it will be found that there is some degree of irregularity and perhaps slight intermittence. The face is usually pale, and alternate flushing and pallor generally intimate the commencement of the first stage of the developed disease, when there can be little doubt of the nature of the case.

Such, I believe, will be found to be a tolerably correct statement of the more important symptoms fairly claiming to be considered premonitory of Hydrocephalus. Different practitioners will entertain various opinions of the relative value of many of these symptoms. For my own part, I have been led to consider the very marked change from the natural aspect and expression of countenance, the listless vacant expression of eye with the dark line beneath, and a constipated state of bowels, with evidence of deficient action of the liver, when associated with any of the above symptoms more directly referable to the brain, as calling for very great watchfulness on the part of the medical attendant, and as justifying serious suspicions of the invasion of Hydrocephalus; and I entertain a strong conviction that judicious treatment in such circum-

stances often prevents the accession of dangerous cerebral disease.

Considerable difference of theoretical views has given rise to great diversity of opinion concerning the importance of any of these precursory symptoms, but more especially of those relating to the digestive function; not merely with reference to the reliance to be placed on them as warnings of the approach of Hydrocephalus, but also regarding the nature of the relation in which they stand to the disease within the head. This, however, is a question the consideration of which it will be better to defer. Yet I cannot avoid urging on the attention of the reader the great frequency of derangement of the liver and an inactive state of bowels as preludes of Hydrocephalus, and the manifest propriety, in suspicious circumstances, of not merely adopting occasional and temporary means for the relief of these symptoms, but of giving them the most serious and continued attention.

It need scarcely be remarked, that, the younger the child, the greater is the difficulty of interpreting aright the various symptoms detailed above, and indeed of ascertaining the existence of many of them.

DIFFERENT FORMS OF THE DISEASE.

The mode in which Hydrocephalus acutus makes its invasion, and the symptoms attending the first

stage, vary so much, that most writers have felt it necessary to describe separately certain varieties of form under which the disease first presents itself to our notice.

The divisions established by Drs. Cheyne and Hopfengärtner (which nearly coincide) have always appeared to me to answer all useful purposes whether of description or practice. Some have described the different varieties according to the appearances observed on dissection; others, according to the type of the attendant febrile action; and others, again, simply according to the degree of acuteness with which the affection runs its course, or the intensity and order of succession of particular symptoms.

I. *Of the first or gradual form* (the nervous of Hopfengärtner, and the nervous and gastric of Breschet, the ataxic of Guersent, and the third and fourth forms of inflammatory disease within the head as described by Dr. Abercrombie). This, although the more chronic, is the more frequent form under which what is called Acute Hydrocephalus is met with in practice; and it is on many accounts the most important, though the least understood by the older nosologists.

The *premonitory symptoms* in this form are very various, and often exist for weeks, or months, before the disease assumes its true character. From the post mortem evidence in these cases, it is often manifest that the disease had really existed long

before it was detected, and that, in fact, what are called the precursory symptoms had been really the attendants on a chronic stage of greater or less duration before the occurrence of any acute symptoms. In cases that had terminated in twelve or fourteen days from the first appearance of decisive symptoms,—from the time, in fact, at which the disease was first recognised,—I have frequently met with such morbid appearances, after death, as were evidently the result of diseased action of much longer standing. The early symptoms in this form of the disease are much more apt to be overlooked, or falsely interpreted, if the child be recovering from some previous debilitating disorder, or if it be of a manifestly weakly, sickly habit, and frequently ailing. More or less fever, with evening exacerbations, occasional pains in the belly, and intermittent headache of various degrees of intensity, are among the most common of the early symptoms; and, as they are generally associated with derangement of the digestive organs, they are very apt to be referred to this cause, and the case considered merely as one of gastric fever, or of worms. It is needless to say, that, if there be any other disease existing at the same time, the cerebral complication is still more likely to be overlooked. In other instances there are no symptoms directly referable to the head, or of any kind which would justify the experienced practitioner in stating that cerebral disease existed, up to within a very short time of the

fatal termination, when its nature is suddenly manifested and when all treatment is futile. But it is seldom that, in this more gradual form of accession, careful observation fails to detect some precursory symptoms, more or less decisive in their character. The child, in almost all instances, will be found gradually to have lost its vivacity, and observed frequently to yawn, knit its brows, start in its sleep, dislike being disturbed, or to move in a languid and unsteady manner, and to have lost flesh.

After a period of very various and uncertain duration, headache occurs for the first time, or returns more frequently, is of a more aggravated character, and accompanied by vomiting. The headache, however, is still, in the majority of instances, not of the ordinary continued character, like that, for example, which attends the early periods of fever; but is marked by paroxysms of acute shooting pain, or twinges, making the child cry out in sudden shrieks. If he be of an age to describe the seat of the pain, he will often refer it to particular parts of the head,—the forehead, one side, or the occiput. Sometimes the child will moan and cry continually, with his hand applied to the head, or exclaiming frequently “Oh, my head!” whilst, in other instances, there is no complaint, nor any distinct intimation of headache, either at first or throughout the disease. The plaintive moan, or cry, of children in this stage of the disease is so peculiar that some have considered

it pathognomonic. Coindet has termed it the "hydrencephalic cry," and considers it as aiding materially the diagnosis.

The occurrence of spontaneous vomiting along with this headache is very general and characteristic, and the association of these two important symptoms seldom allows of any doubt concerning the true nature of the malady. In some instances the vomiting is severe and incessant, almost all ingesta being immediately rejected; and this will continue for two, three, or four days. In other cases it occurs more occasionally during the first day or two, or perhaps only once or twice, or there is merely nausea, and that only when the child is raised. Both the vomiting and headache are aggravated by motion, and particularly by the erect posture, so that the child always seeks to maintain a recumbent position.

Now these two symptoms, headache and vomiting, which I consider by far the most important, as denoting the occurrence of the acute stage, are usually preceded or attended, for a day or two, by febrile symptoms, (though these are not of the same character or severity as in other forms of the disease,) which are sometimes ushered in by a distinct attack of rigor. There are alternate chills and flushing of the face, but the latter symptom is often scarcely noticed; and the prevailing aspect of the countenance, in a large number of cases, is pale. Any slight exertion, however, will generally

be followed by a more or less transient vermilion blush of the cheeks. The pulse is mostly frequent, and has often a degree of sharpness about it; but is very excitable and apt to vary a good deal, in frequency, strength, and regularity. This is the general character of the pulse in the form of which I am now speaking, according to my experience; but I know there is considerable difference of opinion entertained concerning the usual character of pulse at this period. That cases occur in which the pulse is, from the first, natural or even slow, and continues so till towards the close, I am fully aware; and such cases are, perhaps, more frequent than, from the statements of Whytt and others, we should suppose: yet I believe the general rule is as I have stated.

Slowness of pulse is certainly more characteristic of a subsequent stage, when effusion has taken place, or other cause of pressure exists. I am far, however, from considering the state of the pulse at any period as an infallible index, either of the stage of the disease, or the state of the brain. In cerebral diseases, more than in almost any others, the pulse merits the designation of *res fallacissima*. But to this subject it will be necessary to revert in another place.

The temperature of the skin is seldom much increased, and is often below rather than above the natural standard. It is, however, generally dry and harsh, and the integuments of the head are sensibly

hotter than other parts. Peculiar dryness of the nose and lips, on which particular stress is laid by Gölis, is certainly a very constant characteristic even in the early stages.

The tongue is usually coated with a white or yellowish fur, though it may previously have been clean, and the breath has a peculiarly bad smell, as noticed by Whytt, Sprengel, and others, and assented to by Gölis, though by many others either not mentioned or denied. There is almost entire anorexia; but it is seldom that the children complain of thirst. They will often, however, crave for food, which, when given them, they will not eat. The bowels, still, in the large majority of instances, remain constipated; but, in some, become irregular, now constipated, and now loose. The urine is scanty and turbid; in other respects it varies greatly in appearance, and I am not disposed to place much reliance on any of the many special characters attributed to it by authors. Coindet, for example, speaks of a milky, or micacious appearance of the urine, which he considers characteristic of the disease.

During this state of things it is most usual for the children to lie with one or both hands up to the head, moaning, and, every now and then, starting up in a fit of screaming, or rolling the head about from side to side on the pillow, and grinding the teeth; when thus roused by pain, or by any other cause, they betray great restlessness and fret-

fulness, wishing perpetually to be placed in some fresh posture. The elder children complain of pains in the neck, in the limbs, or belly, as well as the head. The brows are knit, the eye very sensitive to light, and the pupil generally contracted.* The eyelids are partially or entirely closed. The ear being morbidly sensitive, the children start at trifling sounds, and are evidently much annoyed by any noise. Preternatural sensitiveness of the skin, particularly of the scalp, is often observed.

These symptoms, marking what is usually termed the first stage of the disease, are of variable duration, but generally last from ten to twelve or fourteen days, and gradually alter their character. Increased sensibility at length gives way to somnolence, which eventually passes into coma. The vomiting ceases, but the headache, though less complained of, continues. The child now generally lies on the back with the knees drawn up, and takes little or no notice of anything going on around; light and noise no longer distress it, the eyelids are half open, and the eye dull and vacant. The state of the pupil in this stage varies much, but becomes very sluggish; sometimes it remains

* A contracted state of the pupil is the most usual, according to my observation; but the most opposite statements have been made with respect to this point. Alterations in the colour of the iris have also been mentioned as characterising the early periods. This I have not observed.

contracted, but more frequently becomes dilated, or fluctuates between varied states of dilatation and contraction, and the two pupils often do not act in unison: the sight becomes impaired, double vision occurs, and squinting; the eye-ball being generally directed inwards. The pulse, whatever have been its previous state, now fluctuates continually; but it will generally be found to have fallen some beats, and to become slower than natural. Screaming is much less frequent, or gives place to a low moan, or sometimes muttering delirium, the continued drowsiness being occasionally interrupted by a cry or exclamation of pain. Alternate paleness and flushing of the cheeks becomes more marked, and the conjunctivæ are injected. Convulsions now frequently occur, either partial or general; and the head is often thrown back and the spine arched as in opisthotonos. The muscles of one or other of the extremities often remain for many hours, or days, in a state of permanent rigidity, which at length may give place to relaxation, or paralysis and hemiplegia. It is common to see children in this stage flinging about one hand and arm, now applying it to the head, now pulling the bed clothes, now picking the lips, or boring with the fingers at the nose or ears, whilst the other arm is completely palsied. A day or two after, the paralysis may affect the other side, and the one originally palsied be free. The urine and fæces are passed involuntarily.

Emaciation goes on rapidly, though at this period the child will sometimes devour ravenously all that is given. There is, however, great variety with regard to many of these symptoms, as to their order of sequence, their severity, and their duration.

The most remarkable remissions and deceitful changes and appearances of amendment often occur. The child may recover its senses, the stupor may disappear, and a marked improvement in its general state be observed more than once in the course of a few days. These deceptive changes are generally accompanied by an alteration in the character of the pulse, which either falls in frequency, or, if it have previously been slow, rises. In this stage the child is often cut off by convulsions ; or after a week or two, without any particular change in the character of the symptoms, the coma becomes profound, the pulse extremely rapid, irregular, and intermitting ; the circulation is very unequal, the extremities cold, and partial sweats break out, particularly over the forehead ; the lips and gums are covered with sordes, and the cornea coated with a dirty slimy film ; deglutition becomes impeded, the respiration irregular and stertorous, and the child dies in a state of deep coma, unless by convulsions the distressing scene is more abruptly closed.

There is really no essential difference in the character of the more important symptoms at the

commencement and towards the close of the second stage. What is commonly called the third consists but in an aggravation of the symptoms of the second stage. In many cases it is difficult to make any division of the disease into distinct stages ; so great is the variety in the order in which the symptoms occur, that all attempts at artificial division are futile. It is important, however, to distinguish between the symptoms which may be fairly attributed to excitement of the brain, to exalted action ; and those which indicate an oppressed condition of the sensorium and torpor, or obliteration of its functions : or, in other words, those phenomena which indicate more or less complete coma. For, these latter symptoms, in all cases, I believe, must, to a certain degree, be attributed to the *effects* of previous morbid action, whatever may be its nature.

II. *A second form of the disease* not infrequently met with may be termed the *insidious*. It has been particularly described by Dr. Abercrombie, who has justly thought it worthy of distinct mention, not merely on account of its frequency, but also from its very insidious, and, therefore, dangerous character. It does not, however, differ essentially, except in its extreme insidiousness, from that form which we have just described, and need not, therefore, occupy us long in its description. My own experience corresponds with Dr. Abercrombie's, concerning the age at which it is most

frequently observed. Dr. Abercrombie says, "I have observed it most commonly in young persons, towards the age of puberty and upwards."* It occurs, however, in children of from seven to ten years of age; and two of the most striking examples I have met with occurred, the one in a boy of seven years old, and the other in a girl a little older. The chief characteristics of this form are, that it begins as a common feverish attack, the headache is slight, sometimes hardly noticed, and soon abates, the appetite is defective, and various uneasy sensations are complained of. Repeated remissions and aggravations of these symptoms occur, for some weeks perhaps, when the headache, though still not severe, becomes more constant, and accompanied by a peculiar unwillingness to be disturbed, and a degree of oppression. These symptoms, on inquiry, it is difficult to account for; the pulse at the same time being almost natural, having lost the frequency it may have had previously, and the tongue being clean, and the appetite improving. The symptoms of general febrile disturbance do not, however, accord with the permanence and amount of headache. In this way several days more, or, I should say, even a week or two may elapse, when the headache increases with an evident tendency to stupor, and with a falling of the pulse, and then the disease becomes fully developed. In infants, the symptoms in the

* On the Brain, &c., Third Edition, p. 9.

early stage are sometimes so trifling that no alarm is taken till the child is in a state of stupor, which soon lapses into coma, generally attended by squinting. In some of these cases Dr. Abercrombie observes, there is still less appearance of disease of the head, and there is not the slightest complaint of headache through the whole course of the complaint.

III. *The acute, febrile, or inflammatory form*, is the third variety that I shall notice. In this, the febrile symptoms are of the type called inflammatory. Many of the cases in the onset can hardly be distinguished from continued fever with predominant head affection, whilst others assimilate more to the phrenitis of the older nosological writers. These, in fact, constitute the only forms of the disease with which pathologists were well acquainted before the time of Whytt. There is great variety, however, in the inflammatory symptoms, and in the general course of those cases which may fairly be classed under this head. Some approximate much more closely to the first form of the disease, already described, and run a comparatively subacute course; whilst others have more of the character of pure phlegmonous inflammation of the brain and its membranes, and run a hyper-acute course. By those, therefore, who are disposed to consider acute hydrocephalus as a specific disease, distinct from acute inflammation within the head, the large majority of the cases

now referred to have, undoubtedly, no claim to that title.

In this more ostensibly inflammatory form the symptoms are, from the onset, referable to the head, without being preceded by any appreciable premonitory symptoms. In the great majority of instances, the first intimations we have of the disease are unequivocal cephalic symptoms. The child may, however, have been drooping for some little time; but there are, usually, none of those evidences of disordered digestive functions, which we have spoken of as preceding the more ordinary and gradual form of the disease. Pain and tenderness of the abdomen which frequently attend this form, come on only with the fever which appears suddenly, and is from the first violent. Frequent and hard pulse, flushing of the eyes and face, acute pain in the head, and intolerance of light and sound, with a white and loaded tongue, are characteristic of this variety. Dr. Cheyne's description of these cases and his marks of distinction between them and continued fever, with which they are so apt to be confounded, are very excellent. "We are led," he says, "to suspect some deeply-seated evil from the frantic screams and complaints of the head and belly, alternating with stupor, or, rather, lowness, and unwillingness to be roused; and we are struck with the great irritability of the stomach which exists in a degree beyond what we generally find it in the fevers of this country; retching and vomit-

ing being brought on by a change of posture, and certainly by every attempt to sit up in bed ; and the disordered state of the bowels which attends the irritability of the stomach is also remarkable ; and when at any time the child has any respite from the violence of these symptoms we find our suspicions confirmed by his looks : for, when the features do not express pain, or terror, there is not unfrequently a vacancy of look, the eyes being set with an expression of dejection which is peculiar to certain diseases of the brain." *

IV. There is a distinct set of cases which, from the particular circumstances in which they occur, merit separate notice. They supervene on the subsidence of some other disease, and constitute what has been termed *Consecutive* or *Secondary Hydrocephalus*.

The mode of attack varies ; but the disease usually runs a very acute course, and unless met by prompt energetic treatment is rapidly fatal. In many cases the first distinct intimation we have of the existence of this very dangerous form of the disease, is the occurrence of convulsions or paralysis, speedily succeeded by deep coma. In other instances they set in with violent headache or delirium.

From what I have seen of this form I should say, that the absence or obscure character of the

* Essay, &c. p. 15.

early symptoms depends not so much, or so often, as has been imagined, on the insidious nature of the disease, as on the very rapid manner in which it is established, and the suddenness with which effusion takes place. But in this variety the more alarming symptoms are certainly, in very many instances, independent of effusion, and may terminate fatally before any fluid has been effused. If, however, by the term insidious, as applied here, it be meant that the disease often manifests itself without having given any distinct warning of its approach, the title is sufficiently appropriate. But if it be meant, that it steals on slowly and imperceptibly, and is gradually developed, I do not think this is generally the case, though it may occasionally be the mode of approach. For I would not class under this head cases that occur during, or subsequent to, dentition, nor those which attend the termination of, or succeed to, chronic affections, particularly of a scrofulous character. Most of these, I believe, are as much entitled to the denomination of idiopathic as any form of the disease.

It is chiefly on the subsidence of acute febrile disorders, and particularly after scarlatina, that the cases occur to which the term *secondary* appears to me strictly applicable. If we were here considering the disease as occurring to adults as well as to children, to the cases I have mentioned should be added those which supervene an acute disease of the kidney and liver. Keeping

in view this limitation of the term secondary hydrocephalus, it will be found generally to present much of the violent character of the third variety. The face, however, is generally pale, the pulse quick, the secretion of urine scanty; and particularly after scarlatina, there generally is, or has been, more or less anasarca. Headache, though sometimes not much complained of, generally precedes all the other cephalic symptoms, and is often almost the only one indicative of the approach of the disease. Dilated pupil, strabismus, and convulsions, or paralysis, mark the subsequent stages of this, as of the other forms, and death occurs, either by way of coma, or in the midst of convulsions.

The connexion of this form of the disease with general anasarca and other dropsical effusions, and with albuminous urine, together with several other important points of its pathology we shall have occasion to notice hereafter. It is to this variety of the disease that the term "water stroke," the "Wasserschlag" of Gölis is most applicable, and I quite agree with Dr. Copland, that it hardly ever occurs in a strictly idiopathic form.

ON PSEUDO-HYDROCEPHALUS.

There are certain forms of disease of not infrequent occurrence which closely simulate those already described, and which may, for the sake of distinction, be conveniently arranged under the com-

mon designation of Pseudo-hydrocephalus. They differ materially in their pathology, and are not amenable to the same treatment, although the general character of the symptoms is so similar, that they are very liable to be mistaken for one or other of the varieties already described. "They may," to use a simile of Mr. Abernethy, "be not improperly compared to certain species of plants by no means uncommon, which are liable to be confounded with others by an inattentive observer." The appropriate term of Hydrocephaloid Disease has been given to one class of these cases by Dr. M. Hall. But there are others which do not fall under the description of the cases to which this term has been applied, and I have therefore ventured to arrange under the general denomination of Pseudo-hydrocephalus, all those forms of disease which, bearing a close resemblance in many important particulars to the affections already described, (and which may be called true, or genuine hydrocephalus,) are liable to be confounded with them.

I. *Of the Hydrocephaloid disease.*—Distinct mention of the affection to which this term has been given by Dr. Hall, was first made by Dr. Abercrombie, in the Edinburgh Medical and Surgical Journal for November 1818; unless indeed the *apoplexia ex inanitione* of the older pathologists be supposed to be the same disease. It was first, however, explicitly and fully described by Dr. M.

Hall under the appropriate title it now generally receives. Dr. Hall's first account of it was given in his Medical Essays, in 1825, and he subsequently read a paper on it at the Medico-Chirurgical Society in 1828. There appeared, soon after this, the admirable account of Dr. Gooch in his work on the more important diseases of women.

These three eminent physicians agree in all essential respects in the account they have given of the affection. It chiefly succeeds to some cause of exhaustion, loss of blood, diarrhœa, over purging, &c. But it has been so admirably depicted by Dr. M. Hall and the other acute physicians to whom I have alluded, that it would be folly on my part to attempt any further description. "This affection," says Dr. Hall, "may be divided into two stages; the first that of irritability, and the second that of torpor. In the former, there appears to be a feeble attempt at reaction; in the latter, the powers appear to be more prostrate. These two stages resemble in many of their symptoms the first and second stages of Hydrocephalus respectively. In the first stage the infant becomes irritable, restless, and peevish; the face flushed, the surface hot, and the pulse frequent; there is an undue sensitiveness of the nerves of feeling, and the little patient starts on being touched, or from any sudden noise; there are sighing and moaning during sleep, and screaming; the bowels are flatulent and loose, and the evacuations are mucous and

disordered. If through an erroneous notion as to the nature of this affection nourishment and cordials be not given; or if the diarrhœa continue, either spontaneously or from the administration of medicine, the exhaustion which ensues is apt to lead to a very different train of symptoms. The countenance becomes pale, and the cheeks cool, or cold; the eyelids are unclosed and unfixed, and unattracted by any object placed before them; the pupils unmoved on the approach of light; the breathing from being quick, becomes irregular and affected by sighs; the voice becomes husky and there is sometimes a husky teasing cough; and eventually, if the strength of the little patient continue to decline, there is crepitus or rattling in the breathing; the evacuations are usually green, the feet are apt to be cold.” *

Dr. Abercombie says, “I have many times seen children lie, for a day or two, in this kind of stupor (resembling coma) and recover under the use of wine and nourishment. It is often scarcely to be distinguished from the coma which accompanies diseases of the brain. It attacks them after some continuance of exhausting diseases, such as tedious and neglected diarrhœa, and the patients lie in a state of insensibility; the pupils dilated, the eyes open and insensible, the face pale and the pulse falls. It may continue for a day or two,

* Lectures on the Nervous System, reprinted from the Lancet, p. 42.

and terminate favourably, or it may be fatal. This affection appears to correspond with the *apoplexia ex inanitione* of the older writers. It differs from syncope in coming on gradually, and in continuing a considerable time, perhaps a day or two; and it is not like syncope induced by sudden and temporary causes; but by causes of gradual exhaustion going on for a considerable time. It differs from mere exhaustion in the complete abolition of sense and motion, while the pulse can be felt distinctly and is sometimes of tolerable strength.”*

Dr. Gooch observes, (with reference to Dr. Hall’s statement,) “the only difference between our experience is this—that he attributes the state which I have been describing to the diarrhœa produced by weaning, or to the application of leeches for some previous complaint. In most of the cases I have seen, however, the child has had no previous illness, and the leeches had been applied subsequent to the drowsiness and as a remedy for it.”† Now though it is true that this observation of Dr. Gooch is somewhat modified, as Dr. Hall has noticed, by the admission in Dr. Gooch’s paper, that the bowels had in all cases been disturbed, before he saw the patient, my own observation would bear out Dr. Gooch’s statement, that the affection may come on without any very manifest cause of exhaustion.

* Diseases of the Brain, &c., Third Edition, p. 309.

† Diseases of Women, &c., Second Edition, p. 354.

I have certainly seen many instances among the children of the poor in which the affection (though generally in a minor degree) had come on gradually, much in the same way that similar affections of the brain occur in connexion with chlorosis, without any previous diarrhoea, purging or depletion. It appears, indeed, from Dr. Gooch's statement, that the first symptoms came on in some instances before the bowels had been disturbed, though this had always been the case at the time that he saw the patients. This point is important with reference to the pathology; for, though admitting, most fully, that exhausting discharges are, in the great majority of cases, the manifest causes of the affection, and will always aggravate and accelerate the disease, I believe the cerebral symptoms are sometimes directly referable to alterations in the vital conditions and properties of the brain, rather than the result of any simple changes in the circulation within the head, the consequence of exhausting discharges. Such changes in the circulation are, no doubt, the most frequent and important causes of the functional derangement, of the altered vital properties of the brain; but alterations in the quality of the blood, in the nutrition of the brain, may equally induce the state of things described by Dr. Hall and his fellow-observers. Hence, defective nutrition of the body and an imperfect supply of the other vital stimuli, particularly of air and light, may, by first inducing a state of irritation, even-

tually induce congestion, or the symptoms simulating Hydrocephalus; and I think I shall be borne out in the statement, that it is in debilitated, weakly children, and chiefly those of the poor, that the Hydrocephaloid disease is seen, excepting where it manifestly succeeds to direct exhaustion.

There is one symptom that does not appear to have been noticed in any of the accounts of this affection, except by Drs. Maunsell and Evanson, and that is squinting. A notion prevails, I think, that it is absent in the Hydrocephaloid disease: but this is not the case: it is frequently present, as well as blindness. Squinting, indeed, is a symptom that often attends slight and temporary derangements of the brain in weakly susceptible children when suffering from derangements of the chylopoietic organs (especially of the liver) attended by febrile action. Ignorance of this remarkable fact may give rise to much unnecessary alarm and anxiety.

II. *Erethism, or irritation of the Brain in Infants.*—Dr. W. Nickoll has thus designated a state of brain occurring in children, which appears to hold an intermediate place between the state of brain in the affection we have been considering and that of inflammation. It may on the one hand run into inflammation, if neglected; and on the other, if too actively treated, is very apt to be followed by symptoms of exhaustion, and of the Hydrocephaloid disease of Dr. Hall. It has been well described by Dr. W. Nickoll in a valuable little

treatise, entitled "Practical Remarks on disordered states of the Cerebral Structures occurring in Infants;" a work which appears to me scarcely to have received the attention which it merits. The conditions of system and of brain described by Dr. Nickoll are well known to perhaps most practical men, but some of them certainly have not received that attention from authors to which they are entitled. Dr. Nickoll enumerates Erethism (sensitive and torpid), simple plethora, inflammation, congestion, collection of watery fluid in the ventricles (hydrencephalus), and torpor, as conditions of the cerebrum occurring in children which may, any of them, exist as distinct affections; and states his belief, that, in the pure uncombined form, each of these states has distinguishing characters by which its presence is denoted. It is, however, the condition which he has described under the name of "Erethism" that presents the closest resemblance to the earlier stages of the disease which we are investigating under the denomination of Hydrocephalus. "It is a state in which inordinate effects arise from ordinary impressions upon different parts of the nervous system;" it is the reverse of that condition which occurs in sleep. The child is wakeful, scarcely ever sleeping, irritable, highly sensitive to every object of sight and sound; the pupil is in many instances more or less contracted, the limbs are in action, the head tossed about; the child cries, without any

apparent cause, the secretion of tears, and from the schneiderian membrane, is often increased; there is unusual liveliness and animation, it wakes suddenly from sleep, and starts at the least noise when awake; the fists are generally clenched, with the thumbs turned in, and the fore-arms bent upwards on the arms; and sometimes a degree of opisthotonos is observed, the legs being drawn up, while the head is thrown back. This state of things constitutes the sensitive form of Erethism, which is usually, though not always, accompanied by increased temperature of the head and of the surface generally, and by an accelerated pulse. The modification of this affection, which the same author terms, rather strangely, "Torpid Erethism," is marked by a want of animation in the child, which is fretful when roused from its dull state, and droops its head; and, though not sleeping, can hardly be said to be awake, being indisposed to move, and indifferent to all objects: there is a general pallor and chilliness of body, and a dull, inanimate expression of countenance, a rolling or turning up of the eyes, and a plaintive moaning, or shrieking.

Some children appear to be much more prone than others to these affections, and it is in the weakly and scrofulous that they are most frequently seen. There is apparently an original difference of nervous constitution, which is predisposed to be thrown into this state of Erethism;

and, when this predisposition is not connate, defective nourishment and a debilitated state of system, from any cause, are apt to induce it. Any long-continued irritation of the nervous extremities, particularly of those distributed on the mucous membranes, may be the exciting cause of this state; hence painful dentition, worms, an unhealthy state of the alimentary canal, disordered states of the liver, burns, ulcers, as well as surgical operations, and concussion of the brain, are among the chief exciting causes. In this state of system, convulsions, it is well known, are apt to occur. In many cases, it is manifestly the spinal system which is in the first instance the seat of irritation. Many of the phenomena are evidently of an excitomotor character; such as the clenching of the fists, the opisthotonos, and the convulsive twitchings. Nor can there be any doubt, that some, at least, of the symptoms commonly ascribed to the brain are more properly to be referred to the spinal system, as, for example, the squinting.

The condition of vascular system attending this state of irritation is not always the same: it is not invariably one of diminished power from previous causes of exhaustion, in which case the condition of brain, and of the system generally, resembles what is called reaction from loss of blood; a state of things which very frequently, indeed generally, to a greater or less degree, precedes the Hydrocephaloid disease, a form which the case speedily as-

sumes, if for the relief of the erethismal condition recourse be had to bleeding and incautious purging.

Extreme susceptibility of the nervous and excitement of the vascular system, to which the term reaction is generally applied, and which so frequently terminates in that particular form of coma attending the Hydrocephaloid disease, is less apt to be mistaken for Hydrocephalus, and treated antiphlogistically, than is that form of Erethism, which, not having been induced by any direct source of exhaustion, is often attended in the onset by a certain excess of power of the vascular system, and by increased determination to the head. The state of things appears to be this: there is a preternatural mobility of nervous system which has given rise to excitement of the heart and arteries, and, from the peculiar state of brain, determination to the head. We have thus all the elements for inducing the more important symptoms of Hydrocephalus.

If the case be so considered, and treated antiphlogistically, irrespective of the peculiar state of the nervous system, exhaustion immediately follows, and then we have, in an aggravated form, the symptoms of reaction; which, if the same treatment be pursued, soon ends fatally, and probably with absolute effusion into the ventricles. The body is examined, this effusion is detected, and is imagined to be the cause of death, and the result

of an inflammatory state of the cranial contents which antiphlogistic measures have failed to overcome. Or, the pathology of such cases may be thus stated: in certain states of the nervous system, unpreceded by any cause of exhaustion, an increased quantity of blood may circulate through the brain, and give rise to all the symptoms of the first stage of an inflammatory affection, but which are not to be removed simply by antiphlogistic means, as these will aggravate the original condition of brain, thus inducing new and still more dangerous symptoms, and the case will terminate fatally, with all the marks of the advanced stage of Hydrocephalus.

On the pathology of such cases judicious treatment throws most light. If there be any manifest cause of irritation present, either from teething, or a disordered state of the bowels or liver, and this be removed, and the child then placed in as quiescent a state as possible, by excluding it from light and noise and every source of excitement, giving a dose or two of some sedative, and nourishing but unstimulating diet, and subsequently a gentle tonic, all the symptoms of cerebral disease vanish.

III. Children are, undoubtedly, subject to a state of brain more correctly perhaps denominated *torpor* than anything else, which generally comes on slowly in the course of protracted illnesses of a debilitating kind, and is chiefly marked by a dull, vacant, list-

less aspect of countenance, with a somewhat dilated pupil, and a remarkably unexcitable state of system. It has appeared to me that this condition of brain and nervous system is generally connected with a depraved and vitiated state of the whole body, which does not admit of speedy correction, but which is most satisfactorily treated by tonics, especially iron, persevered in for some time. The circumstances in which this state of torpor occurs are, for the most part, very much the same as those in which the erethismal state is induced; and the only mode of explaining the different effects on the brain appears to be, assuming an important difference of nervous constitution in the two classes of cases.

Such are the principal conditions of brain which I conceive should be carefully distinguished from Hydrocephalus, more strictly so termed. It would be easy to point out modifications of the states we have just considered, and to give them particular names; but it is very difficult to describe nice shades of difference in the symptoms arising from particular modifications of the conditions of the nervous and vascular systems, and the relations they hold to each other; and still more difficult to do so without entering into theoretical discussions, or giving hypothetical explanations open to numerous objections.

There can be little doubt that not a few of the reported cases of Hydrocephalus have been

of the character just described, and that, on the other hand, many of the cases we have now mentioned have terminated fatally, in consequence of having been mistaken for the inflammatory forms of infantine cerebral disease.

This error has doubtless been fostered and confirmed by the results of post-mortem examinations, and I have no hesitation in expressing my conviction that not merely effusion but various other evidences of inflammatory action have often been the result of treatment resorted to, where inflammation did not exist, and which has induced the very action it was intended to subdue.

CHAPTER II.

STATISTICS OF HYDROCEPHALUS.

UNDER the head of Statistics I propose to ascertain, as far as possible, the influence of sex, age, season, and climate, on the disease we are considering, with a view to elucidate both its ætiology and pathology; availing myself, in the first instance, of the data I have collected to determine more accurately its frequency.

Here I cannot avoid offering my testimony to the value of the labours of Mr. Farr, whose admirable reports on the mortality of this country, and the tables accompanying them, have been published with the returns of the Registrar General. In the present state of statistical knowledge we ought certainly to be cautious how we make practical application to medicine of the results afforded by a science which, all must admit, is likely ere long to throw much light on many of the branches of the healing art. Of the general accuracy of the tables of Mr. Farr there cannot, however, be much doubt; and of this the singular correspondence between the results of the three registrations and reports already published are strongly confirmatory, the differences being such as only render this

confirmation still more complete. Of these reports I have endeavoured to avail myself to the utmost, and the conclusions which they and some other data afford I now proceed to give.

I. *With regard to the frequency of Hydrocephalus.* — From Appendix P. to the Registrar General's first Report it appears that, (after deducting the deaths from old age and from external violence, and those in which the causes were not specified,) of 124,607 recorded causes of death registered in England and Wales during the half-year ending December 31, 1837, 3,570 were from Hydrocephalus; and from the Appendix to the second Report, of 282,940 deaths occurring during the whole year 1838, 7,672 were from Hydrocephalus; and from the third Report, of 283,454 deaths during the whole year 1839, 7,749 were from Hydrocephalus. Of 1,000,000 of each sex the annual mortality by Hydrocephalus, in 1837, was 562 males and 460 females, giving a mean mortality of 511; in 1838 it was 574 males and 450 females, mean 512; in 1839 it was 571 males and 439 females, mean 505. The mean gross annual mortality for 1837 was 2.02 per cent.; for 1838, 2.20, or 1 in 45; for 1839, 2.15.

Now, if we compare the mortality from Hydrocephalus with that from a few other diseases chiefly prevailing among children, we may form some definite notion of its comparative mortality and frequency. I have therefore made out the following table from table B. in the several reports mentioned.

TABLE I.

Shewing, out of a mean population of 1,000,000 of each sex, the annual mortality by certain of the more prevalent and fatal diseases of children.

DISEASES.	1st Report.			2nd Report.			3rd Report.		
	Male.	Female.	Mean.	Male.	Female.	Mean.	Male.	Female.	Mean.
Measles	680	672	676	451	418	434	733	689	711
Scarlatina	360	362	361	391	382	387	675	688	672
Hooping Cough	371	496	434	546	665	605	488	572	530
Croup	256	218	237	326	269	298	294	251	272
Teething	290	254	272	310	277	293	346	307	326
Tabes Mesenterica	66	59	63	50	46	48	50	42	46
Convulsions	1686	1386	1536	1970	1508	1739	1886	1425	1656
Cephalitis*	165	128	147	163	128	146	169	139	154
Hydrocephalus	562	460	511	574	450	512	571	439	505

Now, assuming *pro hac vice* that all the cases of Hydrocephalus occurred in children, there died respectively in the three years, 511, 512, and 505 per million from that cause; and as it appears from p. 53 of the first Report, that 156,974 died through-

* In Mr. Farr's tables under "Cephalitis," he says, "is classed inflammation of the membranes of the brain, as well as a few cases of inflammation of the spinal cord. When the Meningitis occurs in children, it is apparently registered as "inflammation of the brain" if death has taken place in the onset, and as Hydrocephalus when the stage of effusion and stupor has supervened." It is necessary to bear this in mind when employing his tables in an investigation like the present. The cases registered as Cephalitis are, however, very few compared with those of Hydrocephalus, and in some of the tables the two are associated (for convenience) as at least closely allied diseases. I find, on looking over the details of the returns, that so few of the cases under the head of Hydrocephalus occurred in adults, that, for the purposes of our present inquiry, they may be assumed all to have occurred in children.

out England and Wales under fifteen years of age during the whole year, assuming the mortality to be about equal in the two half-years, in that half of which Mr. Farr reports there died 78,487 under fifteen years of age, of which 3,570 were from Hydrocephalus, or more than $4\frac{1}{2}$ per cent. In the year ending June 1839 there were 155,405 deaths under fifteen, and of these 7,672 were from Hydrocephalus, or nearly 5 per cent. According to the last registration, ending June 1840, there were 169,675 deaths under fifteen, and 7,749 were from Hydrocephalus.

The bills of mortality for Berlin correspond very closely with these results. In the year 1833 the deaths below fifteen were 4,009, and of these 196 were from cerebral inflammation or Hydrocephalus, or 1 in 21. In 1835 the deaths below fifteen were 3,477, of which 257 were from Acute Hydrocephalus.

Coindet states, that on an average twenty-one children die annually in Geneva of Hydrocephalus, out of a population of 22,000, exclusive of those dying under one year.* Bouvier estimates that 1,000 children are attacked in Paris annually, of which 750 die.† From an estimate founded on the whole number of deaths occurring in Bonn during a period of thirteen years, Dr. Wolff shews that the proportion of deaths from Acute Hydrocephalus under twelve years of age, to the gross

* Mémoire sur l'Hydrencephale, p. 79.

† Brachet sur l'Hydrocephalite, Paris, 1818, p. 23.

mortality, including adults, is 1:7·51; and to the whole mortality from all diseases under twelve years, 1:3·27. Nasse estimates that from 32,000 to 36,000 children die yearly from Acute Hydrocephalus in the Prussian States, and that throughout Germany the number amounts to 100,000.

These results, however, obtained merely from bills of mortality, are subject, it may be said, to many inaccuracies. Registries of public medical charities would doubtless afford us more certain results; but, unfortunately, these are not generally kept. Dr. Alison, however, states that in the Edinburgh New Town Dispensary, of 201 deaths below the age of fifteen, forty died of Hydrocephalus; and that, of forty-five deaths in the Universal Dispensary for children, eight were from Hydrocephalus.* From Dr. Boyd's Statistical Report of the out-door cases belonging to the parish of St. Mary-le-Bone, it appears that, of 1,862 cases under seven, sixty-seven came under the head of inflammation of the brain and its membranes.† In the Vienna Institution for children, in fifty-six deaths, nine occurred from Hydrocephalus.‡ During the three years from 1831-1833, of six-two deaths at the Clinique at Bonn, twelve were from Acute Hydrocephalus. §

II. *Of the influence of Season.*—The statements of previous writers respecting the influence of

* Transactions of Edinburgh Medical and Chirurgical Soc. v. i.

† Edinburgh Med. and Surg. Journal, July, 1842.

‡ Med. Chir. Zeitung, 1827, Bd. i. p. 221.

§ Idem, 1834, F. Nasse.

season vary considerably, for, on comparing the various series of cases given by different authors, there would appear to be no evidence of season having much influence on the prevalence of the disease; but it is evident that unless we have the combined experience of many practitioners in the same district or locality, and in the same year or years, little or no reliance can be placed on statements relating to the point in question. Of this the remark of Guersent is sufficiently corroborative, who states that he never met with a case of meningitis in the burning heat of summer.* Many authors state that Hydrocephalus is more frequent in summer than in winter; an assertion which is certainly not borne out by the statistical statements I now subjoin.

The salubrity of different seasons varies much in different localities according to the circumstances of population, soil, drainage, &c., and is found therefore to vary materially in different ages. For some time, however, the mortality in England, particularly in the large towns, has been greatest in winter. With regard to Hydrocephalus, the preponderance of cases in the winter and spring quarters does not appear from Mr. Farr's reports to be much more than what arises from this general increased mortality in those seasons; but, though classed by him with diseases about equally fatal in winter and summer, the preponderance in the winter quarters over the autumnal appears to be

* Green, in Lancet.

decided. The following tables I have drawn up from different parts of Mr. Farr's reports, to exhibit the meteorological relations of Hydrocephalus and a few other diseases having a supposed pathological connexion.

TABLE II.

Shewing the Meteorological relations and influence of Seasons in the Metropolis, 1838.

	Winter.	Spring.	Summer.	Autumn.
Temperature at Chiswick (mean)	35°	52°	60°	44°
Do. do. Apartments Royal Society	36°	53°	61°	45°
Dryness measured by Daniel's Hygrometer at Chiswick	1° 9	6° 1	4° 2	1° 0
Electric state not observed; but may be estimated from the number of deaths by lightning	1	10	11	2
Among the diseases, the mortality of which was increased to the highest extent by cold, are found the following:				
Dropsy (deaths from)	501	427	375	465
Apoplexy (do. do.)	299	241	201	246
Among diseases about equally fatal in summer and winter, are				
Cephalitis	128	142	123	142
Hydrocephalus	479	480	417	393
Convulsions	914	834	912	759
Consumption { Males	1048	1137	968	904
Females	896	972	937	825
Total	1944	2109	1905	1729
Tabes Mesenterica	34	45	58	37
Diseases of the digestive system prevailed most in summer.				

TABLE III.

Shewing the influence of Seasons in the Counties of Devonshire and Cornwall, and in twenty-one Mining Districts. (2nd Report.)

DISEASES.	Devonshire.				Cornwall.				21 Mining Districts.			
	Quarters				Quarters				Quarters			
	1	2	3	4	1	2	3	4	1	2	3	4
Hydrocephalus	60	64	45	52	25	28	24	22	118	110	86	99
Cephalitis	21	14	7	12	8	7	12	8	23	24	18	13
Convulsions	122	144	90	105	65	56	42	57	450	406	291	312
Apoplexy	78	61	46	59	34	25	28	27	58	56	46	61
Dropsy	161	120	97	136	52	77	53	58	152	176	113	98
Consumption	419	508	382	340	334	317	299	320	667	775	653	524
Tabes Mesenterica	3	5	5	2	1	—	1	4	10	9	14	3

TABLE IV.

Deaths from Hydrocephalus, &c. registered in the Metropolis during the four quarters of the three years, 1838, 39, 40.

TEMPERATURE	Highest	58° 3	85° 0	80° 0	63° 5
	Lowest	11° 4	29° 8	41° 7	21° 2
	Mean	39° 8	53° 8	61° 0	44° 6
THREE YEARS.					
		January, February, March.	April, May, June.	July, August, September.	October, November, December.
CAUSES OF DEATH.		271 Days.	273 Days.	275 Days.	275 Days.
Hydrocephalus		1370	1330	1348	1231
Cephalitis		390	459	433	421
Convulsions		2414	2298	2532	2119

My own experience would lead me to believe that meteorological peculiarities had considerable influence in inducing the disease. I have usually observed that cases of Hydrocephalus seldom occur singly; but are frequent at certain periods, and then do not occur again for some time.

The same observation I have found, in conversation with medical friends, has been made by others.

Dr. Jahn has described an epidemic of Hydrocephalus that occurred in the months of April and May, commencing in the latter end of March and terminating in the beginning of June. The winter had been wet from frequent slight falls of snow, and was also characterised by occasional thunderstorms, but not much severe cold. The early spring was remarkable for violent storms and rain, alternating with very hot weather. The influenza prevailed for a short time, the chief characteristics of which were pulmonary complaints and unusually severe hysterical affections. Among children, simultaneously with Hydrocephalus, some cases of croup were seen, and catarrhal affections of a croupy character, together with urticaria and a few cases of scarlatina. Hydrocephalus, however, was the most predominant disease, "so that in the course of from eight to twelve weeks," says Dr. Jahn, "twenty-one cases occurred in my own practice, though seven other physicians practise in the same district." "I do not reckon in this number those slight forms that were speedily cured; nor those cases of cerebral disease which many would class under the name of Hydrocephalus, but which I have considered as cerebral convulsions; nor, finally, some doubtful cases of which no post-mortem examination could be obtained. It may, therefore, with strict propriety be said that the disease was epidemic;

though I have no means of ascertaining whether it was equally frequent in the practice of other physicians in the same locality. The same abnormal condition which had manifested itself in adults under the form of influenza, evidently laid the foundation, in most cases, for the cerebral disease, which was always preceded either by catarrhal fever or by some affection of the external ears. The disease appeared under all the forms assumed by Acute Hydrocephalus; as encephalitis, meningitis, a purely nervous disease, as a simple non-inflammatory subacute cerebral dropsy, as the termination of latent insidious Hydrocephalus, as cerebral congestion, &c. The disease terminated as it began, by becoming gradually less and less frequent; so that, like any other epidemic, it presented all the several stages of increment, acmé, and decrement, and up to the middle of July had not been succeeded by any other prevailing malady.”*

III. *Influence of Climate.*—Little or no mention is made, by the various authors who have written on Hydrocephalus, of the influence of climate in its production. The conclusions deducible from the investigations I have made on this subject appear calculated to throw some light on the pathology of the disease. The tables in the Reports of the Registrar General, in which abstracts are given of the mortality from the various classes of

* The above is a summary of Dr. Jahn's account in an essay entitled “Versuche für die Prak. Heilk.” Eisenach, 1835.

disease in cities and in different parts of the country, are peculiarly valuable. "In examining," says Mr. Farr, "the special causes of death, three classes may be distinguished: one class, which was exaggerated in cities to the highest pitch; a third class, in which the mortality was nearly the same, or in excess, in the counties; and an intermediate class."*

Hydrocephalus, it appears, belongs to the first class, or that which is exaggerated in cities to the highest pitch; for, to 1·00 death in the counties, the deaths out of the same amount of population in the cities were, from cephalitis and Hydrocephalus, 2·41.

Table F, in the second Report (p. 164), gives a comparison of the fatal diseases, 1st, of the districts of the metropolis; 2nd, of twenty-four towns; 3rd, of Cornwall, Dorset, Devon, Somerset, and Wilts; and, 4th, of Norfolk, Suffolk, Essex, Sussex, Gloucestershire, Herefordshire, and Westmoreland. Of this table the following is an abstract.

TABLE V.

Shewing the Comparative Mortality from Hydrocephalus in towns and in the country.

	Metro- polis.	Towns.	Total.	Total.	S. West Counties.	Norfolk &c.
Deaths from Hydrocephalus	1,769	1,292	3,061	1,177	603	574
Estimated population in 1838	—	—	3,726,221	3,539,908		

* Second Report, p. 81.

Whence it appears that the deaths from Hydrocephalus in the metropolis are *nearly treble* those of the south-western counties, and *more than treble* those of the counties of Norfolk, &c., and *nearly one third* more than those of the twenty-four towns.

Now, the difference, it must be observed, in the gross mortality of the metropolis and the agricultural districts is by no means so great as this, being only about two-fifths more.

The difference of mortality in the whole class of nervous diseases in towns and in the country is greater than in most other classes, and considerably greater than in diseases of the respiratory system, which, of course, includes pulmonary consumption.

From a table (Q, 2d Report) drawn up with a view to shew the relative mortality from various classes of disease in different districts of the metropolis, as illustrative of the effects of a crowded state of population, it appears that the annual rate of mortality per cent. is higher in the crowded districts, from diseases of the nervous system, than from phthisis; being $\cdot 518$ from the former, and $\cdot 485$ from the latter. In those districts in which the mean number of square yards is 35 to each person, the annual rate of mortality from diseases of the nervous system is $\cdot 518$ per cent.; and, in those in which the mean number of square yards is 180, the mortality is only $\cdot 374$.

In all the returns under the head of "Nervous System," the deaths from Hydrocephalus, it must be remembered, constitute a large proportion of sporadic diseases: Hydrocephalus, convulsions, and consumption are among those which are the most fatal in the most crowded, wretched, and ill-ventilated districts of large towns. The adjoining table, composed from different parts of the second and third Reports of the Registrar General, will shew the comparative mortality from the above diseases in the different districts of the metropolis.

TABLE VI.

The following Table exhibits the proportion of Cases occurring in the different Districts of the Metropolis.

DISTRICTS.	Population 1831.	Square yards to 1 person. 1838.	Deaths from						Annual rate of Mortality per cent. 1839.					
			Hydrocephalus.		Convulsions.		Consumption.		Gross Mortality.	From Epidemic Diseases.	The Nervous System.	Phthisis.		
			1838.		1839.		1838.						1839.	
			1838.	1839.	1838.	1839.	1838.	1839.						
Kensington . . .	85,352	388	107	92	179	154	440	339	2.069	.356	.362	.363		
St. George, Hanover Sq. Westminster . . .	58,209	75	59	47	66	56	272	214	1.866	.271	.287	.301		
St. Martin's in the Fields	47,992	72	53	56	93	75	284	221	2.529	.642	.377	.384		
St. James, Westminster	23,483	52	32	31	40	27	105	114	2.965	.646	.433	.484		
St. Mary-le-Bone . . .	37,725	19	39	22	54	46	186	149	1.837	.290	.275	.365		
St. Pancras . . .	122,206	48	153	139	200	194	543	496	2.030	.368	.356	.336		
Islington . . .	103,548	92	152	124	155	115	491	443	2.204	.570	.310	.323		
Hackney . . .	37,316	271	48	43	54	43	192	175	1.780	.339	.277	.307		
Poplar . . .	34,527	434	22	21	43	30	142	131	1.674	.245	.222	.306		
	25,066	See Stepney	28	25	87	57	141	133	2.063	.344	.391	.416		

HYDROCEPHALUS.

Stepney . . .	72,442	144	78	75	197	150	336	354	2,302	483	355	373
Bethnal Green . . .	62,018	46	46	54	183	147	220	184	2,293	589	476	230
Shoreditch . . .	68,564	35	60	55	177	168	276	261	2,554	553	475	304
Whitechapel . . .	64,141	25	60	42	174	177	346	295	3,528	747	485	452
St. George in the East	38,505	25	48	52	111	90	190	197	2,533	523	415	440
East and West London	70,833	16	76	81	151	158	387	345	3,281	774	518	480
City of London . . .	57,080	30	65	68	61	59	217	206	1,932	374	358	355
St. Luke's, Middlesex .	46,642	22	50	46	125	109	195	185	2,337	524	418	361
Clerkenwell . . .	47,634	27	56	70	98	88	215	197	2,358	504	404	346
Holborn . . .	37,927	19	58	51	87	87	185	177	2,770	700	512	444
St. Giles and St. George	52,907	22	51	55	166	127	275	261	2,734	671	476	478
Strand . . .	42,479	18	38	42	84	62	181	170	2,465	597	380	389
St. Saviour, St. Olave	51,732	29	55	58	136	120	276	314	3,504	683	520	594
Bermondsey . . .	29,741	88	52	41	108	93	149	147	2,420	625	482	427
St. George, Southwark	39,769	See St. Olave	56	61	97	102	238	171	2,756	705	551	394
Newington . . .	44,526	54	56	48	87	87	230	222	2,084	415	381	386
Lambeth . . .	87,856	146	79	116	215	181	423	427	2,029	446	363	341
Camberwell . . .	28,231	557	37	24	54	32	133	125	1,892	377	335	304
Rotherhithe . . .	12,875	249	9	11	12	3	67	62	2,548	469	231	462
Greenwich . . .	63,564	321	46	58	125	124	352	329	3,002	550	460	482
	1,594,890	...	1769	1708	3419	2961	7687	7104	2,367	504	393	373

The American writers have adduced some striking evidence in illustration of the vast increase of inflammatory affections of the brain in the large towns of America. From Dr. Brigham's late work * it appears, that, while the population of New York has only quadrupled in the last thirty years, the deaths from inflammatory affections of the head, or from inflammation and dropsy of the brain alone, have increased more than *twelfefold*! The deaths from these causes in the first and last six years, and the corresponding population, will be seen by reference to the adjoining table.

TABLE VII.

Shewing the Increasing Mortality from Hydrocephalus in New York.

	1805	1806	1807	1808	1809	1810	1833	1834	1835	1836	1837	1838
Inflammation of Brain	17	16	15	17	18	12	101	120	150	159	161	155
Dropsy of do.	16	22	30	28	28	42	305	347	382	268	365	368

POPULATION.

1805	1810	1815	1820	1825	1830	1835
75,770	96,373	100,619	123,706	166,086	197,112	270,089

It appears, therefore, that an alarmingly disproportionate increase has taken place in the mortality from Hydrocephalus; almost all the cases of which are stated as having occurred to children. The

* An Enquiry concerning the Disorders and Functions of the Brain, &c. ; by A. Brigham, M.D. New York, 1840.

mortality from Hydrocephalus in London appears to have increased in a similarly disproportionate ratio.

The following table from a paper by Mr. Shattuck, in the American Journal of Medical Sciences for April, 1841, affords additional fearful evidence of the increased mortality from Hydrocephalus in Boston (U.S.) as the population has increased.

TABLE VIII.

Shewing the Increasing Rate of Mortality from Hydrocephalus in Boston.

Deaths from	1811—1820.		1821—1830.		1831—1839.	
	No.	Ratio per 1000.	No.	Ratio per 1000.	No.	Ratio per 1000.
Apoplexy .	109	12·8	107	9·3	162	11·1
Convulsions	229	27	309	26·9	419	28·7
Hydrocephalus	86	10·1	270	23·6	498	34·1

The population in 1790 was 18,038, with 201 square yards to each inhabitant; and, in 1837, 80,325, with only 49 square yards to each person. The increased density, therefore, was as 5 to 1; and, while the mortality per 1000 from apoplexy and convulsions remained nearly the same, that from Hydrocephalus was more than trebled!

These statements may be allowed to produce their natural effect on the mind of the reader without any comment on my part. I would, however, simply remark, that the increased mortality from Hydrocephalus in crowded cities must be attributed

not merely to the influence of climate on the children, but also to that exerted on the parents, and therefore, in some measure, to the increase of hereditary predisposition, one of the most important causes of the disease.

We have no means of ascertaining with precision what may be the influence of topographical peculiarities in rural districts on the production of the disease. Hydrocephalus, however, has long been considered as almost epidemic in the Valois, where the best effects result from the removal of the children from the district. Where several children have already fallen victims to this dreadful scourge in the same family, it would indubitably be desirable to attempt the nurture of any future children in some fresh and more favourable locality.

IV. *Influence of Sex.*—The conclusions deducible from Mr. Farr's tables on this point shew how little any statements of a statistical character drawn from individual experience are to be relied on. Most of these statements are evidently but vague assertions founded on some general impression made on the minds of their authors; whilst others, though based on more certain data, are drawn from observations far too limited to warrant the deduction from them of any general conclusions.

Most writers say that Hydrocephalus is more frequent in females than in males; but all the tables in the Reports of the Registrar General shew a decided preponderance of males over

females. Of 209 cases collected by Coindet at Geneva, 104 were boys and 105 girls. At the Hôpital des Enfants, according to Dugès, the number of girls affected with Hydrocephalus was greater than that of the boys in 1815, whilst in 1817 the number of the two sexes was exactly the same. Dr. Copland says, "I believe that previous to the tenth year the disease is most frequent in boys.* Ludwig, Cheyne, and C. Smyth think, that, after ten, girls are the more subject to it. On looking over those cases occurring in my own practice, of which I have complete notes, I find 5 were girls and 5 boys. Of the cases given by Abercrombie as Acute Hydrocephalus, there are 7 boys and 3 girls; and, of those under the head of Meningitis and Inflammation of the hemispheres of the brain, there are 6 boys and 7 girls. Of 15 cases that I have collected from Dr. Bright's Reports, 10 were girls and 5 boys; of 36 cases given by Gölis, there are 20 boys and 15 girls and one uncertain. So that the statements on this point made from data derived from personal experience, it is evident, are not to be trusted. Gölis, however, on this, as on many other points, is more correct than most writers; for he distinctly states that boys are more subject to it than girls.† Of the 20 cases recorded by Schweninger, 13 were boys and 7 girls, or nearly two-thirds.‡

* Dict. Pract. Med. p. 659.

† Op. cit. p. 47.

‡ Ueber Tuberculose als die gewöhn. Ursache d. Hydroceph. Acut. Regensburgh, 1839.

The difference of mortality between males and females throughout England and Wales in 1838 was considerable. The population was calculated at, males 7,668,245, females 7,885,615: the annual rate of mortality was, males 2·28, or 1 in 44; females 2·12, or 1 in 47. The differential mortality, however, is greater than this in early childhood, and greater in early childhood than in advanced age; so that, as has been justly remarked by Mr. Farr, "some of its causes must be looked for in the intimate structure and properties of the body." It is, however, very difficult to assign any satisfactory physiological or anatomical reason for the differential mortality in certain diseases; of which Hydrocephalus forms a remarkable example, for the deaths registered under this head were 4,242 males and 3,430 females. The deaths by whooping cough were 4,036 males and 5,071 females; by consumption, 27,935 males and 31,090 females. So that, while consumption appears to be 8 per cent. more fatal to females than to males, Hydrocephalus is 20 per cent. more fatal to males than to females. Diseases of the nervous system in general are 23 per cent. more fatal to males than to females, and the chief difference appears to arise from the diseases affecting children, of which Hydrocephalus is a striking illustration.

The annexed table will be sufficient to shew that the difference of mortality between males and females does not arise from accidental cir-

cumstances, but is general, from whatever locality the returns are made.

TABLE IX.

Relative Mortality of Males and Females from Hydrocephalus.

	Metropolis.		Five Counties.		Provincial Cities		Seven Counties.	
	M.	F.	M.	F.	M.	F.	M.	F.
Hydrocephalus	992	777	322	281	699	593	316	258
Cephalitis .	307	228	99	82	178	150	100	100

(From Tables D. & E.—2nd Report of the Registrar General.)

All the Registration Reports agree on this point; and it may therefore be considered as a well-ascertained and remarkable fact, that Hydrocephalus is very much more frequent in male than in female children.

V. *Influence of Age.*—The age at which Hydrocephalus most frequently occurs, may be more accurately ascertained from the medical records of the disease, than most other similar points, whilst here the Registration Reports afford us less assistance. It is easy, without reference to the general statements of authors on this head, to collect from a tolerably large number of cases, of which the ages are given, at what period of life the disease is most common.

Dr. Green, by adding 16 cases from Abercrombie and Mathey to 139 observed at the Hôpital des

Enfans, has obtained a sum of 155 cases, of which there were

From	2	to	4	years inclusive	.	.	.	.	45
„	5	„	7	„	„	.	.	.	54
„	8	„	10	„	„	.	.	.	29
„	11	„	13	„	„	.	.	.	22
Above	13			„	„	.	.	.	5

Hence, out of these 155 cases, 99 were under seven years of age, 54 occurring between five and seven years.

On comparing the ages of 36 cases in Gölis' work, I find there were

Under	2	years	.	.	.	.	.	.	11
From	2	to	4	years	.	.	.	.	17
„	5	to	7	„	.	.	.	.	6
„	8	to	10	„	.	.	.	.	1
„	11	to	13	„	.	.	.	.	1

So that, of these 36, there were 34 under seven years of age; 17 occurring between two and four, and 9 at one year and under.

Of 29 cases under fifteen, given by Martinet and Parent Duchatelet under the head of Meningitis, there were 14 under eight years and 15 above that age. Of 15 cases collected from Dr. Bright's Reports, 10 were under seven years, 5 of them occurring between two and five. Of 10 cases in my own note-book, 8 were under seven, and 5 of these 8 under five years. Of the 20 cases given in Schweninger's pamphlet, all were under eleven years of age; 15 under five, of which 8 were from nine

months to three years, 7 from three to five, and only 5 between five and eleven.

It follows therefore, that, out of a sum of 265 cases, 182 occurred under the age of seven years; whilst only in 46 did the age exceed ten years, and the number of cases under one year is very small. These statements will, I think, be found to agree with the experience of most who have seen much of the diseases of children. Dr. Green concludes, from his researches, that the disease is most frequent from five to seven; but this is not borne out by the additional facts which I have adduced. But it is, perhaps, sufficient for all useful purposes to know that between two and seven years of age the disposition to the disease is greatest.

VI. *Duration of the Disease.*—The ordinary duration of Acute Hydrocephalus has been variously stated. Gölis, Cheyne, and others, state that it usually runs its course within three weeks. Dr. Fothergill says, “I have seldom been able to trace the commencement of the disease above three weeks:” and Dr. C. Smyth, “Upon the whole, judging from my own experience, as well as from that of others, I think the average duration of the original disease, from first to last, may be fairly taken at from three to four weeks; sometimes it may extend to five, perhaps even to six; but I have seen none, where the skull did not give way, of longer continuance.”* He also observes, and justly I think,

* Treatise on Hydrocephalus, p. 29.

that great mistakes regarding the duration of the disease have been made in consequence of confounding the symptoms of some previous illness with those arising from the disease within the head. But the fact is, that it is often difficult to acquire correct information respecting the precise time at which cerebral symptoms have first made their appearance; nor am I disposed to place much confidence in the results to be obtained from an examination of cases with reference to this point where the observers have not made it a special object of attention.

Dr. Green, however, has attempted to obtain more precise information on this point. "Joining," he says, "16 cases from Abercrombie to 111 observed at the Hôpital des Enfants, we have a sum of 117 in which the commencement of the disease was ascertained. Of these, 80, or nearly two-thirds, terminated within the first fortnight; whilst we find only one-eighteenth of the whole number exceeding the period of three weeks." The duration of the 117 cases was more precisely as follows:

Within	7 days	.	.	.	31	terminated.
"	14 "	.	.	.	49	"
"	20 "	.	.	.	31	"
Beyond	20 "	.	.	.	6	"
					117	

The duration of the disease in Schweninger's cases was

In 7 from 8 to 14 days.

6 „ 15 to 22 „

1 „ 35

1 above 40.

2 chronic.

3 uncertain.

—

20 Mean duration of the 15 cases, 17 days.

—

These results agree very closely with those which I have obtained from an analysis of the cases by Gölis, in which the periods of accession and termination can be ascertained; for, out of 28 cases, 18 terminated within the first fortnight, and only 2 exceeded the twentieth day.

These statements coincide also with my own experience; according to which, I should say that the disease seldom extends beyond three weeks.

CHAPTER III.

MORBID ANATOMY.

WE have abundant data for ascertaining how far the inflammatory or non-inflammatory nature of Hydrocephalus (the most important point to be determined) can be decided by means of Morbid Anatomy.

In an essay, the compilation of which must have cost him great pains, Dr. H. Nasse has reviewed and classified the various morbid appearances that have been described by different pathologists as occurring in connexion with Acute Hydrocephalus.* In the following detail of morbid appearances I shall adopt an arrangement somewhat similar to that of Dr. Nasse, and notice, in the first place, those cases in which no marks of an inflammatory nature are found, or only such as are of doubtful character; secondly, those in which, in connexion with various morbid appearances within the ventricles, there are found distinct marks of meningitis, either of the base or of the convexity of the brain; and, thirdly, those in which equally distinct marks

* Untersuch. zur Physiol. u. Pathol. Bonn, 1835.

of a similar character have been seen in the ventricles and in the substance of the brain. I shall then notice separately those evidences of morbid action, within the head, which are of a character distinct from inflammation, though often, perhaps generally, connected with it; and finally shall pass in review the morbid states of other organs associated with the cephalic disease.

It has been doubted whether Acute Hydrocephalus ever proves fatal without leaving behind some traces of inflammatory action in the membranes of the brain.* There is, however, abundant evidence, from cases already recorded, to prove that copious effusion may be poured into the ventricles without any other mark of inflammatory action, either in the ventricles, or in other parts of the brain and its membranes. That such cases of Hydrocephalus are met with, is admitted even by some who are fully convinced of its inflammatory nature in the majority of instances. Coindet, for example, who has designated the disease in a mode intended to intimate its inflammatory nature, admits that there is an Acute Hydrocephalus free from all marks of inflammatory action.†

In many of Mills' cases, given as examples of acute uncomplicated Hydrocephalus, the only morbid appearance is stated to be the collection

* Guersent, Dict. de Méd.; Charpentier, De la Nature, &c. Paris, 1829, p. 23; and, I believe, some others.

† Mémoire sur l'Hydrencephalite, ou Cephalite Interne Hydrenceph. Paris, 1817, p. 42.

of fluid within the ventricles.* Bricheteau appeals to various cases related in his treatise as proofs of the same fact.† Dr. Bright gives at least one case in which fluid distending the ventricles was the only morbid appearance met with; and several others in which the abnormal appearances were very trifling, and doubtful with regard to their inflammatory nature.‡ Cases 3 and 33, in Berton's Researches, come under the same category.§ Nasse admits having met with many cases free from all inflammatory marks in the membranes of the brain, and others in which these were so very trifling as scarcely to be worth mentioning.|| Andral has given several valuable cases of acute effusion into the ventricles without any trace of inflammatory action.¶ Dr. Copland states, with reference to the sub-acute form of the disease, that in the examinations he has made, "with the exception of common injection of the membranes, there were no remarkable inflammatory appearances within the encephalon;" and with regard to the hyper-acute form, or water-stroke, he says, that "after death sometimes no

* An Account of the Morbid appearances in various Disorders of the Brain. Dublin, 1826.

† *Traité Théor. et Pratique de l'Hydroceph. Aigue, ou Fièvre Cérébrale des Enfants.* Paris, 1829.

‡ Hospital Reports, vol. ii. pt. i. p. 38, case 15; and pt. ii. p. 649, case 310.

§ *Recherches sur l'Hydrocephale Aigue, &c.* Paris, 1824.

|| *Untersuchungen zur Physiol. u. Pathol.* Bonn, 1836, p. 441.

¶ *Clinique Médicale*, pp. 22 and 24, cases 19 and 22.

traces of inflammation are to be seen.”* Finally, I may refer to Abercrombie, (a high authority, it will be admitted,) who, though contending for the inflammatory nature of the disease in most cases, has given two examples of idiopathic Hydrocephalus proving fatal without any other morbid appearance in the brain excepting effusion. These, however, he states, are the only examples of *idiopathic* Hydrocephalus he had seen of the kind, and they both exhibited the disease in its most insidious and chronic form, having lasted about a month in each instance: but the two following cases in his work are of precisely the same character, as far as regards the morbid appearances; the disease, however, in these instances succeeded to a blow on the head.† I have myself met with two strictly idiopathic cases in which effusion into the ventricles and at the base of the brain, with a little, beneath the arachnoid, was the only morbid appearance. The texture of the brain was in one of these cases remarkably firm, perhaps rather whiter than usual, and the plexus choroides pale.

I might adduce still farther evidence in support of this important fact, that Acute Hydrocephalus is sometimes met with in this, the purest and most uncomplicated form; but sufficient has been given for the present purpose. Now, it can hardly be necessary, before proceeding farther, to adduce any

* Dict. of Pract. Med.; art. Hydrocephalus.

† Dis. of the Brain, &c., 3rd ed.; cases 63 and 64.

argument to shew that the simple presence of serous effusion is no proof of the previous existence of inflammatory action, not even when attended by increased vascularity in the structures whence the effusion has issued. A reference to any elementary work on pathological anatomy will convince those who may be at all sceptical on the point, that this is the only inference which can be drawn from a careful consideration of facts. There is then a certain number of cases in which morbid anatomy affords no evidence, if it do not satisfactorily disprove that Acute Hydrocephalus is in all instances of an inflammatory nature. I proceed to the consideration of the next most simple class of cases, in which the central parts of the brain are found in a more or less diseased state; these morbid lesions being usually associated with more or less effusion into the ventricles.

As a general rule, the whole substance of the brain in Acute Hydrocephalus is found in a softer state than natural (though Gölis asserts the contrary); but in some cases, which have run a very acute course, it is as firm as in the healthy state. One of the most frequent morbid appearances is a local softening of the central white parts. The corpus callosum, fornix, septum lucidum, and other parts forming the walls of the ventricles, are frequently found so softened and broken down as to present no trace of their natural form and

structure, being reduced to a diffuent pulp, sometimes of scarcely more than the consistence of cream. Every possible degree of this softening has been observed. Sometimes, the septum lucidum and fornix are merely thinned, and rendered of so delicate a consistence as to tear readily on being stretched; at other times, a ragged irregular opening is found in the septum lucidum, from the central parts having fallen out. This state of softening is usually, but not invariably, accompanied by more or less effusion into the ventricles. This condition, of so very frequent occurrence, there can be no doubt, as Dr. Abercrombie remarks, "holds an important place in the pathology of the brain, particularly in the pathology of Acute Hydrocephalus;" and a most interesting and important point in its history is, "that it may be fatal without effusion and without any other morbid appearance, though with all the symptoms which are usually considered as indicating Acute Hydrocephalus." To ascertain the nature of this change in the cerebral substance is, therefore, all-important in connexion with our present subject.

Dr. Abercrombie has "no hesitation in considering it as the termination of inflammation in those particular parts." Others, however, as well as myself, have considerable hesitation in viewing this white softening as a simple result of inflammation. I shall not here enter on the consideration of the different forms of *ramollissement* to which the cere-

bral substance is liable, nor on the relation they have to each other. The essential physical characters of the softening in question, "white softening," it may however be well to call to mind, before entering on the question of its nature.

The consistence of the parts thus affected, as I have already observed, varies greatly. They may either be so little altered, that the softening is detected, only by careful examination with the finger; or they may be reduced to a creamy pulp. The cerebral matter in all the stages of this degeneration is of a pure white colour, without odour, and having none of the characters of purulent matter. Very occasionally the colour is of a greyish or yellowish tinge, but this is chiefly when the grey matter of the brain is implicated along with the white. All trace of the fibrous structure of the cerebral matter is lost when the softening has proceeded to any great extent. In an earlier stage, however, we find the cerebral substance separated into fibres, the interstices being filled with clear water; and, subsequently, these fibres are replaced by flocculi, which in their turn become converted into a pultaceous mass. Mixed with the creamy pulp, to which the parts are often thus reduced, may sometimes be seen a few drops of limpid serum. Thus the lining membrane of the ventricles is often detached, forming a loose bag, in which the degenerated cerebral matter is contained. In this state the slightest touch will tear the fornix

or septum, so that the ragged irregular openings seen in these parts are frequently but the consequences of the manipulation necessary to expose them to view. There is no surrounding vascularity or redness, but frequently an œdematous condition of the adjoining parts. The case recorded by Abercrombie, of which so much is made by the advocates of the inflammatory origin of this disease, is the only exception to this last statement with which I am acquainted.* The extent and particular locality of the softening varies greatly in different cases. Sometimes, a small spot in the posterior wall of the ventricle is affected, without the fornix or septum lucidum being implicated; at other times, these are the only portions affected; whilst we sometimes find the whole of the parts forming and surrounding the ventricles more or less disorganized. The substance of the brain throughout, when the lesions of which I am now speaking are the only ones met with, is paler, rather than redder, than natural: when this is not the case, there will generally be found more or less decided evidence of inflammation of the membranes. Although sometimes associated with important changes in the lining membrane of the ventricles, this degeneration of the cerebral matter is generally unaccompanied by anything more than slight opacity of the arachnoid. In the simple cases, however, it will usually be found that the serous

* Op. cit.; case 47.

membrane lining the ventricles has not lost its natural smooth and glistening appearance, and their walls are in general remarkably white. But, even when the lining membrane appears opaque and thickened, this is in general owing simply to its infiltration with serum from contact with the surrounding softened cerebral matter and the fluid in the ventricles. Has not this often been mistaken for thickening from inflammation and the effusion of fibrine? In connexion both with the first class of cases spoken of, and with those at present under consideration, the following morbid appearances are observed.

The plexus choroides is usually pale and collapsed, and most observers have noticed the occasional presence of small vesicles studding its surface. They appear to be owing merely to circumscribed collections of fluid in the meshes of the pia mater.

Unless the quantity of water effused be very considerable, the large vessels of the pia mater are usually somewhat gorged; but, when the distension of the ventricles is great, the pressure exerted on the brain generally tends to keep these vessels empty. The longitudinal sinus is usually empty, or contains a little dark fluid blood.

Beneath the arachnoid, covering the surface of the brain, we sometimes find slight serous effusion, and, consequently, more or less opacity of that membrane. But this is more common at the base

of the brain; where, in consequence of the peculiar appearances presented, it has often been mistaken for coagulable lymph.

Numerous bloody points are often observed on slicing the substance of the brain, which, however, is in general remarkably white. The grey substance is often rather darker, and extends deeper than usual.

The skull is not infrequently of a deep blue colour, particularly towards the sutures; an appearance remarked by Gölis, and which I have frequently noticed. In eight of the twenty cases detailed by Schweninger this was also observed. Inequality of the thickness of the cranial bones has been mentioned by several writers; and, in some instances, I have noticed the same.

In respect to the frequency of occurrence of the softening of the central parts, most modern authors agree that it is by far the most common of all the morbid appearances met with in Hydrocephalus. Nasse states, that, with the exception of some extremely rare cases, he has found it constantly; it was present in sixteen of the twenty cases detailed by Schweninger. But it is needless to dwell on a point on which all pathologists so entirely coincide.

The fluid usually found effused in the ventricles, either with or without softening, is generally limpid, bright, and clear as crystal; sometimes of a light straw-colour, or slightly turbid. Unless, however,

the examination be deferred till long after death, particularly in hot weather, it will be found that, the less softening there is, the clearer is the fluid. But when the softening is extensive, or when the ventricles are opened in a careless manner, the fluid is very turbid. These facts have not been sufficiently noticed, and hence the nature of the turbidity of which I now speak has frequently been mistaken. It has too often been considered as intimating an admixture of coagulable lymph, or purulent matter; but it depends on the falling-in of the softened cerebral matter, and the mingling of the pulp, to which it is reduced, with the previously clear watery fluid.

This distinction between the different causes of the turbidity of the fluid found in the ventricles it is of importance to notice and rightly to appreciate. As might naturally be expected when the softening has proceeded to a great degree, the effused fluid has occasionally been found sanguinolent from the escape of blood from the minute vessels, which in this state of things become isolated, and deprived of their natural support. A bloody appearance of the fluid has, however, been but seldom noticed.

The quantity of fluid found after death varies greatly, and by no means corresponds with the symptoms during life. This want of correspondence is sometimes so remarkable, that we should be led from this circumstance alone to doubt the dependence of the more important symptoms on the effu-

sion of fluid within the ventricles, were there no other reasons. It is, however, now so generally admitted that the quantity or even the existence of any fluid is comparatively of little consequence, that there is less need for endeavouring to harmonize the different statements that have been made respecting the usual amount found, or the quantity supposed to be requisite to constitute the case one of Hydrocephalus. It must also be remembered that a small quantity (the result of the halitus exhaled from the serous membrane in a state of health) is always found after death. This, however, seldom exceeds 3j. ; but it increases, some time after death, as a consequence of the changes taking place *post mortem*. If the examination be made within forty-eight hours, and more than 3ij. or 3iij. are found, it must be considered the result of morbid action. When, however, the agony of death has been long protracted, when there has been co-existing disease of the heart or lungs, or any other long-standing impediment to the circulation through the head, or previously existing great debility of system, much more fluid may be found in the ventricles without proving any antecedent inflammatory action, or even without implying that any cerebral disease at all existed. These circumstances should always be taken into consideration before we receive the amount of fluid effused as evidence of cerebral disease.

As a general rule, the more acute the disease has

been, the less water will be found, and *vice versâ*. The quantity, also, as a general rule, is greater in those cases, of which we are now considering the morbid anatomy, than in those where there is undoubted evidence of inflammation of the membranes at the base, or covering the convexity of the brain. Whytt considers the average quantity to be from ʒij. to ʒiiij.; Coindet gives from ʒj. to ʒvj.; Gölis, from ʒij. to ʒiiij.; Bright, from ʒj. to ʒiv. The statements of other authors vary still more, probably from the quantity having been guessed at, and not measured in any way. My own experience would accord with that of Nasse, that, *cæteris paribus*, the younger the children, the higher is the average quantity; but that the amount seldom exceeds ʒvj. in cases having any claim to the title of acute, and is not usually above ʒiiij. or ʒiv. It is rare to meet with softening of the central parts without the effusion of more or less serum into the ventricles; but such cases occasionally occur, though for the most part in adults.*

Sometimes, when no fluid is found in the ventricles, they are enlarged, and have evidently been distended by fluid, which, in consequence of the hygrometric properties of the brain, has been imbibed after death; so that, on the one hand, the absence of any fluid, and, on the other, the presence of a certain quantity, may be the result of changes

* Vide, e. g., Abercrombie's cases 48 and 49.

taking place *post mortem*. From the experiments of Guillot it appears that the brain is capable of taking up a quantity of water equal to its own weight by virtue of the physical property of imbibition. It is of importance to bear in mind these facts when discussing the pathology of cerebral diseases.

Besides the fluid in the ventricles, there may be some effusion beneath the arachnoid; and this will sometimes explain the rapid course the disease may have run, when the morbid appearances within the ventricles are trifling. But, although effusion in these two localities may co-exist, we usually find the general arachnoid cavity free from any preternatural effusion in that form of the disease which is now under consideration, and its surface is often preternaturally dry.

The fluid effused, both in Acute and Chronic Hydrocephalus, has been frequently analysed, and the results of the analyses of different chemists correspond very closely with each other.

The analysis of Marcet gives, in 1000 parts,

Water	990.80
Muco-extractive, with a trace of albumen	1.12
Muriate of soda	6.64
Subcarbonate of soda, with a vestige of an alkaline sulphate	1.24
Phosphate of lime, with traces of phosphate of magnesia and of iron	0.20
	1000

Dr. Bostock gives the following as the proportion of the ingredients in 1000 grains of fluid, taken from a chronic case of Hydrocephalus :

Water	982·6
Albumen	6·
Muriate of soda	7·
Soda	1·4
Urea and osmazome	3·
Sulphuric acid, lime, potash	a trace
	1000

On comparing these results with those which he had obtained on the analysis of the fluid of acute cases, “the circumstances,” he observes, “in which the fluid obtained from the chronic differed from that in the acute forms of the disease are as follows. The whole amount of solid contents was more than double the quantity of animal matter; generally, was nearly six times greater: the albumen in particular was, perhaps, twenty times more abundant; it contained a considerable quantity of urea: while the muriate of soda, and the uncombined soda, were nearly in the same quantity in the two fluids.” *

Attempts have been made to distinguish between the fluid effused in Hydrocephalus, and that found in other circumstances, by its coagulation, or non-coagulation, on applying the usual tests for albumen: but there does not appear to be any

* Vide Bright's Reports.

ground for such distinction. The fluid poured forth by the arachnoid seldom contains beyond a very small quantity of albumen; but that it differs from that found in other serous cavities in never being coagulable by heat, is not true. Baillie, Blackall, and others besides myself, have found it coagulable. But when the marks of inflammatory action within the ventricles are of a decisive character, then indeed we find the fluid effused containing abundance of albuminous matter.

Having thus briefly stated the physical characters of the white softening of the central parts of the brain, and the more important appearances seen in connexion with it, I proceed to inquire into the nature of this singular and important change of structure.

A diminution in the cohesion of parts, the seat of inflammation, is, we know, one of the first effects of this morbid action in other parts of the body; and we have good proof that the brain forms no exception. When, indeed, we reflect on the peculiar delicacy of the structure of the brain, it would be strange if this effect of inflammation were not evinced here. All the usual results of inflammatory action, whether acute or chronic, may be detected in the brain when it has been the seat of that morbid action; and we find that the different effects of inflammation hold the same relation to each other, and follow in the same order, in the brain, as they do elsewhere. We observe the cere-

bral substance first injected, and pouring forth an increased quantity of serous fluid; then softened, then secreting pus, and finally the seat of ulcerative absorption, or even of gangrene. As, therefore, we find in ordinary circumstances, that, where the brain has been the seat of inflammatory action, it presents, after death, all the anatomical characters of inflammation; when most of these characters are wanting, and that not merely in particular instances, but in a large class of cases; not merely in the early, but in all the stages of the disease; not merely where the symptoms have been of a chronic, but where they have been of the most acute character; ought we not to hesitate before we attribute the appearances, which *are* observed, to inflammation? But, farther, is there not additional reason for doubting the inflammatory origin of the lesions in question, when we know that very similar changes are of frequent occurrence in circumstances which have led all pathologists to look for some other cause than inflammation, and which changes are now very generally acknowledged to admit of a different and satisfactory explanation? The white softening, of so frequent occurrence in old people, and which has of late years attracted so much attention, is, I believe, hardly by any pathologist now considered as the effect of inflammatory action. It may generally be shewn to be associated with such disease of the vessels as must interfere with the circulation and nutrition of the brain. I have

found this softening of the brain associated with ossification of the arteries, from the largest to the smallest, so general throughout the organ, that on slicing it, in almost every part, the opposition presented by the diseased arteries to the action of the scalpel was as though the brain had been traversed by wires. There is also another class of cases, in which it appears to me almost impossible to conceive that inflammation can have been the cause of the softening. I allude to those that have been described by Bouillaud and others, in which the whole brain, cerebellum, and spinal cord, in very young children, are simultaneously affected with softening. One of the most remarkable instances of this kind is mentioned by Andral as occurring in the practice of Dr. Delandes. In this case, of a child three years old, the whole substance of the brain, cerebellum, and pons was reduced to such a state of softening, that it could not be touched without being destroyed: there was no trace of injection, and not a drop of serum in the ventricles; the pia mater was red.*

In a case described by Billard,† the greater part of the brain was reduced to a diffuent pulp, having scarcely any trace of organization. In this, and in others of a similar kind, an odour of sulphuretted hydrogen was exhaled by the degenerated struc-

* Andral, Clin. Med., p. 165. Spillan's translation.

† *Traité des Maladies des Enfants Nouveaux Nés*, p. 625, 2nd edition.

tures. All Billard's cases occurred in newly-born children; and he has adduced good reason for believing, that, in some instances, the malady had commenced *in utero*. Dr. Copland has met with the same condition of the brain in young children.* Softening of the central parts has also been frequently observed in adults, attended, in most instances, with serous effusion into the ventricles, but without any other sign of inflammation. The majority of these cases have occurred in circumstances rendering the existence of inflammation improbable, and associated with general debility of system. Most of them were phthisical cases.†

Andral has taken special notice of these important facts, and, in describing the state of the brain in the cases I have last referred to, he says: "The corpus callosum, in a portion of its extent, was visibly softened; but, above all, the septum lucidum and the fornix no longer existed, except in the form of a whitish pap, which was raised as a liquid substance, and which exposed the choroid plexus. This softening, or rather liquefaction, of the fornix, terminated, posteriorly, at the commencement of each corpus fimbriatum; and, anteriorly, at the bifurcation of its anterior pillar: each of the divisions of the latter might be traced, as usual, as far as the mamillary bodies, which re-

* Dict. Pract. ed; Mart. Brain, alterations of.

† Andrai, Bright, and others.

tained their healthy appearance. In one of these cases, the white substance which forms the external covering of the optic thalami had participated in the pulpy softening of the fornix; it was partly destroyed, and exposed to view the grey substance. In fine, at other times, but always in consumptive persons, we also found, softened, liquefied, and completely destroyed in several points, the species of white cortical substance which covers the inner grey substance of the cornu Ammonis." Now, the similarity, or rather identity, of these morbid appearances with those found in the commonest forms of Hydrocephalus, can hardly be questioned. The opinion, therefore, of so high an authority as Andral on the nature of these changes is important, and will have its due weight. "The softening now spoken of," he says, "does not present, in an anatomical point of view, any of the characters of inflammation: we do not find, either around it, or where it exists, any trace of vascular injection; there is nothing to prove that the softened substance contains pus, since it retained its natural colour; in a word, its consistence only is changed. A chain of reasoning, founded on very admissible analogies, may certainly lead us to admit that this change of consistence is sufficient to prove the existence of inflammation. This opinion has some probabilities for it, but no fact proves its strict accuracy. As for our part, we should be disposed to compare the particular cerebral softening now in

question with certain softenings of the heart, and of the muscles of animal life, and of the parietes of the stomach, the inflammatory nature of which we do not hold to be a thing proved, and which depend, probably, as we have already hinted, on the greater or less change which the phænomena of nutrition must necessarily undergo in all the tissues, when, under the influence of a certain number of chronic diseases, the blood is no longer duly modified or repaired.* Again, in the review which he takes of the various kinds of softening presented by the brain, after admitting, as we all must, that this alteration of consistence is *sometimes* the result of inflammatory action, he asks: "But if, in other cases, we do not find within the softening any trace either of sanguineous injection or of purulent infiltration; if we find then, in a word, no other alteration but softening itself; will it not be an abuse of analogy to conclude that in these cases, also, the cause which has deprived the brain of its consistence is inflammation? *A fortiori*, will not one be induced to admit it in those other cases, where the softened part has become, at the same time, the seat of anæmia? Observe, besides, that among these cases of white softening there are some which have formed very rapidly, after the manner of acute diseases; and in such cases it cannot be supposed that the softening has commenced by a sanguineous congestion, which

* Clin. Med., p. 541. Spillan's trans.

would disappear according as the affection assumed a chronic course." Andral is thus compelled to come to the conclusion that this form of softening of the cerebral substance "is a specific alteration of nutrition which may supervene under the influence of morbid conditions widely differing from each other:" a conclusion to which I also have felt compelled to come, and which appears to me the only legitimate one to be drawn from the facts we at present possess.

Out of 101 cases of phthisis, Louis found softening of the central parts of the brain, of the same character as that which occurs in Acute Hydrocephalus, in six. In two there had been no previous cerebral symptoms; and in three others, though such symptoms had been present, there were other lesions in distant parts of the brain which sufficiently explained them, independently of the softening.* Louis also states, that, not only in phthisical, but in other chronic cases, he has found softening, both partial and general, more common than in cases of acute disease.† In his *Anatomico-Pathological Researches* he has also given an instance of sudden death occurring to a person apparently in good health, and in which extensive softening of the central parts was found.‡

It may, I am aware, be said, that the arguments ad-

* *Recherches sur la Phthisie*, p. 155.

† *Idem*, p. 157.

‡ *Mém. ou Recherches Anat. Path. &c.*, p. 492.

duced against the inflammatory origin of the lesions in question, apply only to active or acute, and not to subacute or low forms of inflammation, to which the softening is by many ascribed. But we have abundant opportunities of studying the effects of this kind of inflammatory action on the brain, and we find them to be such as attend the same form of inflammatory action in other parts. We have, indeed, undoubted evidence of inflammation accompanying softening in many instances, as seen in the effusion of pus and the injected state of the surrounding parts, and the coating of the adjacent membranes with fibrine, or their adhesion to the cerebral substance.

I am not unaware of the recent microscopic investigations into the nature of encephalomalacia, and of the attempts that have been made to connect the presence of the "exudation corpuscles" of Gluge and Valentin with the existence of inflammatory action. The observations of these authors, confirmed as they have been by Dr. Hughes Bennett, are valuable, as proving that morbid material changes may exist in the brain that are not detectable by the unaided sight, and which may sufficiently explain the attendant symptoms of nervous derangement; but they by no means prove that the majority of the cases of white softening seen in Hydrocephalic diseases are of inflammatory origin: for, in the first place, it is not affirmed that the "exudation corpuscles" are seen in all cases of white softening; and, in the next place, in many

instances in which they have been seen, there has been no other evidence of inflammatory action, and therefore no reason why we should not consider them merely as proofs of perverted nutritive action.

Finally, I would observe, and it should not be forgotten, that, as the softening of which we are speaking is often, or rather generally, unattended by any of the physical characters of inflammation, so it is often seen in cases that have not manifested during life any of the symptoms of inflammation, and that it frequently occurs in circumstances opposed to the supposition of inflammation being its cause. In Hydrocephalus, it is true, it is often seen in those cases in which the symptoms have been of the most acute character, and in which, if they have been really attributable to inflammation, it must be considered as of an acute, and not a chronic character, and yet we find none of the ordinary effects of acute inflammation that has lasted for many days. But, even in the simple cases followed by effusion only, the symptoms during life sometimes so closely resemble those attending inflammation within the head, that they are with difficulty distinguished; yet we know that many of these cases are the result merely of irritation, or of direct exhaustion of the system. To the hygrometric properties of the brain, already referred to, it should also be remembered, we must refer many cases of the central softening found after death: for it has been fully proved (by Dr. Paterson) that the parts nearest to the

cerebro-spinal fluid are the first to manifest pseudo-morbid softening after death; and there can be very little doubt that many of the reported cases of softening from disease have been nothing more than instances of pseudo-morbid softening. The period after death at which the examination takes place is not always mentioned, nor taken into consideration, as it ought to be.

I come now to consider the morbid appearances presented by another and very large class of cases, in which we find distinct evidence of inflammation of the membranes covering the brain. In consequence of the loose manner in which the accounts of *post-mortem* examinations are given by many authors, it is difficult to ascertain in what proportion of cases inflammatory marks of a decisive character are presented by the membranes enveloping the brain. Later writers, however, are more explicit; and all agree, that, in a very large proportion of cases, Acute Hydrocephalus is attended by more or less extensive meningitis.

From the elaborate work of Parent Duchatelet and Martinet it appears, that in children meningitis much more frequently occupies the base than the convexity, and the opposite occurs in adult age. Of 15 cases under seven years of age, the meningitis occupied the base in 10; in 16 cases from seven to fourteen years of age, the inflammation affected the base alone; or the base, and one or other convex surface, in 13: so that, of the

whole number of these 31 cases under fourteen years of age, the base was the part affected in 24. On the other hand, of 76 adults, the convexity alone was the seat of the inflammation in 46, and the convexity and base in 21, whilst only in 8 was the base alone affected. These results, establishing the much greater frequency in children of meningitis of the base than of the other parts, have been confirmed by subsequent pathologists. Any one, indeed, who has had many opportunities of examining the state of the brain after death in children dying of cerebral disease cannot fail to have been struck with this important pathological fact.

With regard to the frequency of occurrence of meningitis in connexion with effusion into the ventricles, there is still much difference of opinion. Martinet and Parent Duchatelet* so constantly found effusion of lymph, or pus, at the base of the brain, that they affirm Hydrocephalus to be nothing but meningitis of that part.^x Charpentier found effusion of lymph in *all* cases. According to Drs. Green, Ruz and Gerhard, and others of the French school, meningitis of the tubercular character "accompanies Acute Hydrocephalus in the vast majority of instances, and probably constitutes its pathological character." This statement appears warranted by the conclusions to which its authors have been led by the cases that have fallen under their observation; for, according to Dr. Green,

* Op. cit.

x Auch ein Fall von glatte bestatigt dieses, so dass in solchen Fallen die Masse in den Ventrikeln bloß eine secundäre war.

out "of a sum of 60 cases observed at the Hôpital des Enfants between the years 1833 and 1836, no less than 56 presented traces of tubercular meningitis." * These results, however, have not been confirmed by other observers. Dr. Nasse says, "According to my observation, in nearly half the fatal cases of Hydrocephalus there is effusion beneath the arachnoid of a soft but compact yellow matter." "This is usually situated posterior to the commissure of the optic nerves, and at the commencement of the fossa Sylvii." †

In the greater number of the 36 cases given by Gölis, meningitis appears to have existed; but his dissections are given in so brief and unsatisfactory a manner that it is difficult to render them available for our present purpose. Cheyne mentions effusion of coagulable lymph at the base of the brain in 4 out of the 7 fatal cases in which the head was examined. Senn mentions the same appearance in 5 out of 12 cases. Of the 20 cases contained in Schweninger's pamphlet, meningitis existed in 13, and in the majority occupied the base and the fossa Sylvii. In 5 out of 10 cases that I have examined there have been traces of meningitis. Abercrombie, Bright, Cruveilhier, Brichteau, Berton, Brachet, Mills, Coindet, and many others that might be named, make frequent mention of the effusion of coagulable lymph beneath

* Green, in *Lancet*; and Ruz' Thesis.

† *Op. cit.*

the arachnoid, as well as other marks of meningitis. We have, therefore, ample evidence of the frequent association of meningitis with Hydrocephalus. It is difficult, if not impossible, to ascertain the precise proportion from all the authorities I have mentioned; but we may without much hesitation affirm, that in more than half the fatal cases of Hydrocephalus there is evidence of meningitis.

Whatever may be the relation between the meningitis of children and effusion of serum into the ventricles, it is evidently more close and important between the meningitis of the base than between inflammation of other parts. When the meningitis is confined to the convexity, the ventricles are generally *free*; whereas, according to Martinet and Parent Duchatelet, it is very rare indeed to meet with meningitis of the base *without* effusion of serum into the ventricles. Occasionally, however, it is seen unaccompanied by any effusion into the ventricles. In every instance Ruz found a preternatural amount of effusion. In all the 20 related by Schweninger this was also the case. Dr. Green merely says, "in the majority of cases there was effusion into the ventricles, varying in quantity."

The frequent concurrence of meningitis, and more or less inflammation of the substance of the brain, associated with the effusion into the ventricles, has induced Charpentier to consider Hydrocephalus as in reality meningo-cephalitis; and

many modern writers speak of Hydrocephalus as cephalitis of children, adopting that term as a general expression for inflammation of the brain and its membranes. If, however, we put out of the question the disorganization of the central parts of the brain, constituting the white softening, we shall find that but a comparatively small number of cases are associated with inflammation of the substance of the brain. Superficial and local inflammation of the cortical substance from extension of the inflammation of the membranes is not indeed, as might naturally be inferred, at all uncommon. In 11 of the 20 cases examined by Schweningen, the pia mater adhered firmly to the cortical substance, admitting of being detached only here and there to a small extent, and then often carrying with it a portion of the cerebral substance. Such alterations certainly prove that the cerebral substance has participated in the inflammatory action. But, in addition to this evidence of cerebritis, we occasionally meet with portions of the hemispheres, deeper seated, that have evidently been the seat of local inflammation, as indicated by softening and surrounding redness, and effusion of purulent matter. I have found considerable portions of the brain thus destroyed. These cases are, however, rare, and would not, perhaps, by most be considered as fairly coming under the head of Hydrocephalus.

The *substance* of the brain often presents an un-

usual number of bloody points, both in the cases unassociated with meningitis, as well as in those in which the membranes are implicated. Nor have I been able to ascertain that this evidence of increased vascularity of the cerebral substance is connected with any particular alteration in the consistency of the brain.

The cortical parts I have often observed darker, and bearing a greater proportion than usual to the rest of the brain. The large amount of cortical substance seen in many who have died of Hydrocephalus is an interesting fact in connexion with the frequent precocity of intellect manifested during life.

The general consistence of the brain varies much in these cases. I have found it of more, as well as less, than the ordinary consistence. In one case that I lately examined, though more than thirty-six hours had elapsed since death, and the weather was at the time very hot, and the disease had run a course of about fourteen days, the consistence of the brain throughout was remarkably firm.

In connexion with the marks of inflammation which we have mentioned, whether confined to the membranes or not, in a large proportion of cases, we meet with the same softening of the central parts of the brain as in the first form of the disease. The fluid in the ventricles has also usually the same clear pellucid appearance, and there is the same absence of all positive marks of inflammation of

the membranes lining the ventricles. The meningitis of the base, therefore, can hardly be considered as the result of extension of inflammation from the *membranes* of the ventricles.

The inflammation of the base sometimes extends, as might be expected, over other parts of the surface of the brain; but it is certainly by no means usual to find it extending so far as to implicate the membranes covering the convexity. Somewhat more fluid is usually observed beneath the arachnoid, in these cases, than in the more simple ones that we have already considered; and the pia mater, generally, is perhaps in most cases more vascular than natural.

The *third class* of cases, of which we have yet to speak, are those in which we find undoubted evidence of inflammatory action *within* the *ventricles*; e. g. effusion of fibrine or of pus, and changes in the serous membrane lining these cavities, evidently resulting from inflammation. These cases are for the most part associated with inflammation of the membranes of the base. A slight glance at the cases on record will shew that such marks have been much less frequently seen than might have been expected, on the supposition that the morbid action giving rise to those more common changes in the ventricles, of which mention has already been made, has been really inflammatory. Even Dr. Abercrombie makes mention of such appearances in two only of his cases. The bright clear trans-

parent appearance of the fluid in Acute Hydrocephalus, admitted on all hands to be characteristic, is sufficient to prove that the lesions in question are rare. The effusion of lymph, and still more the formation of pus, must render the fluid turbid; and yet, if we even reckon those instances in which the turbidity has probably arisen from the mingling of the softened, disrupted cerebral substance with the effused fluid, (and which has often been mistaken for the consequence of inflammatory exudation,) we shall find the proportion of cases very small in which a turbid state of the fluid has been seen. The precise proportion it is not very easy to ascertain; but of 26 cases, including adults, in Dr. Abercrombie's work under the head of Acute Hydrocephalus, in two only were the appearances within the ventricles of a decidedly inflammatory character. In none of the cases given by Dr. Bright was anything of the sort observed. Of the 20 cases detailed by Schweninger, although more or less softening of the parts surrounding the ventricle was observed, sixteen times, twice only was the fluid at all turbid, and in not one instance was there any decided deviation from the healthy appearance of the lining membrane, with the exception of serous infiltration in a solitary case. I have never myself met with any decisive evidence of inflammation within the ventricles. From Gölis' statement, however, it would appear, that, in 22 of his 36 cases, there was effusion either of pus or coagulable

lymph. This, as I have before hinted, is opposed to the observations of all other authors.

It is needless to particularize the appearances in different cases of the kind in question; suffice it to say that they correspond with those indicative of the various grades of inflammatory action in other serous membranes. It is not, as might be anticipated, always in the most rapidly fatal cases, or in those in which the inflammatory symptoms have been most severe, that effusion of pus has been observed; death, in such instances, often taking place before there is time for the formation of pus. For the most part, the quantity of fluid in the ventricles in these cases is small, and in this important respect they differ remarkably from those of other forms. Inflammatory effusions at the base very constantly accompany those into the ventricles. Effusion of an unequivocally inflammatory nature within the ventricles, unassociated with any effusion of lymph, or pus, at the base, or some other part of the membranes of the brain, is, I believe, exceedingly rare. The greater number of cases of which we are now speaking have occurred either in adults or in children more advanced than those which are generally the subjects of other forms of the disease.

There is, however, one morbid appearance that requires particular notice, seen both in the form of which we are now speaking and in that in which the inflammatory marks are confined to the

membranes at the base. I allude to the granular appearance of the serous surfaces, arising from the deposition of lymph in the form of minute grains. A similar appearance is often seen in other serous membranes that have been the seat of inflammatory action. By some, there can be no doubt, these lymph-granules have been mistaken for tubercles. Whatever may be the nature of the granules seen on the pia mater, external to the ventricles, those which occasionally give to the serous membrane, lining the cavities, a roughened appearance are, I believe, generally the results of the deposition of lymph that has been partially organised.

The indications of *scrofulous action* within the cranium constitute so important a part of the morbid anatomy of the present disease, that I have thought it desirable to consider them separately. On referring to almost any of the works on cerebral disease, since the time that morbid anatomy has been assiduously cultivated, we find scattered remarks on the frequent association of evidences of scrofulous action with those trains of symptoms to which the term Hydrocephalus is applied, as well as with the existence of effusion into the ventricles; and, if we trace the literary history of the disease, during the last thirty years down to the present time, we find the subjects of tubercular action and deposition assuming a more and more prominent part in all disquisitions on its pathology.

My present object is simply to review those morbid appearances within the head which are referable to tubercular action. These may be divided into two classes : 1st, those indicative of that form of inflammation to which the terms "low," or "scrofulous," are usually applied, and which may be unaccompanied by any actual deposit of tubercle ; and, 2nd, those characteristic of the different forms under which tubercular depositions present themselves in other parts of the body.

I. Associated with more or less injection of the pia mater, we sometimes meet with a yellowish gelatiniform effusion, transparent for the most part, but here and there opaque, and approaching more to the character of ordinary coagulable lymph. The pia mater, the arachnoid, and occasionally the dura mater, are all subject to this kind of exudation. There is very little and imperfect adhesion of the different adjacent parts associated with this peculiar effusion, but usually more or less serous fluid. Similar effusions are seen in the abdomen and pleural cavity in connexion with diseases of a scrofulous character, and are then considered as characteristic of tubercular action. On careful examination there is generally found some slight deposition of caseous opaque unctuous matter along with the gelatinous effusion, but this is sometimes so trifling as not to be noticed. This form of effusion appears to be intermediate between ordinary fibrine and tubercular matter. In one instance (of

a chronic character) I found this gelatiniform exudation four or five lines in thickness, and so general, that the membranes and surface of the brain were all confounded by it into one common mass, rendering it impossible to distinguish the several membranes. In a *minor degree* it is not at all infrequent at the base of the brain. But in this situation there is frequently seen an appearance that is apt to be mistaken for the exudation in question: I allude to the effusion of simple serum into the meshes of the pia mater, where, until cut into, it presents all the appearances of gelatiniform matter, or lymph.

II. Tubercular matter may be deposited in the membranes, or in the substance of the brain, under three forms: 1st, in that of caseous matter of various degrees of consistence, and either in patches, or in extensive layers. This is seen chiefly on the surface of the pia mater, between the convolutions which are thus glued together; it is usually most abundant at the base, and along the fissura Sylvii, and the course of the large vessels. 2nd, in the form of granulations, or miliary tubercles, on the surface of the pia mater, either scattered singly, or collected into groups of various sizes. 3rd, as large masses of solid tubercular matter embedded in different parts of the cerebral substance. Of the first and last forms of tubercular matter seen in Hydrocephalus I need say nothing; but with regard to the second form,

or that of granulations, there is some difference of opinion. A tubercular state of the pia mater, first noticed by Dance, is mentioned by Dr. Abercrombie, who quotes also the accounts given of a similar state by Drs. Clarke and Powell. But the two essays of Drs. Gerhard and Rufz first directed special attention to the frequent occurrence in Hydrocephalus of minute granulations on the pia mater. Out of 37 cases they found these granulations in 27; the 10 cases in which they were not observed being those which occurred at an early period of the investigations of these authors. They are described as "small, hard, whitish granulations seated on the pia mater, about the size of millet-seeds, and semi-transparent. They are chiefly found at the base of the brain and along the fissure of Sylvius." * In 19 of 20 cases examined by Dr. Green, similar morbid appearances were found. "In only one case were the pia mater and cerebral substance free from any trace of granulation and infiltration, and in this case the abdominal and thoracic viscera were equally free from the tubercular degeneration." † From these and similar facts Dr. Green and many of the French pathologists, with some in this country, have concluded that these granulations constitute an essential character of Acute Hydro-

* Rufz' Thesis, p. 16.

† Green, in *Lancet*, vol. ii., 1835-36, p. 267.

cephalus; and, deeming them of a scrofulous, or true tubercular nature, the term "tubercular meningitis" has been proposed as an appropriate designation of the disease with which they are associated. It must, however, in the first place, be mentioned, that subsequent observers have not confirmed the statements of the authors above mentioned as to the frequency of these granulations. Out of 20 cases, of which the *post-mortem* examinations are most carefully detailed by Dr. Schweningen, they occurred, only five times. I do not remember ever to have seen them; and I know, from conversation with others who have looked for them, that they are by no means so frequently seen in this country as they would appear to be in France. But, in the next place, it is not at all certain that these granulations, of however frequent occurrence, are really of the same nature as scrofulous tubercles. Rouchoux, in the *Journal Hebdomadaire* for January 1835, has contended, and I think successfully, against this view. He and Schweningen, and many others, believe these granulations to be merely depositions of lymph, like those granular false membranes of so frequent occurrence in the pleura or peritoneum, where none of the organs present any trace of tubercular disease. In Schweningen's cases there does not appear to have been any relation between the presence or absence of simple meningitis and tubercular deposition in other organs.

It is difficult, if not impossible, to collect from authors the proportion in which tubercles of the ordinary form are found within the cranium in connexion with Hydrocephalus; but Abercrombie, Bright, Cheyne, Watson, Andral, Cruveilhier, and many others, speak of the frequent occurrence of scrofulous depositions within the head, either in the form of tubercular masses, or of lardaceous caseous matter. Schweningen found actual tubercles in 4 of his 20 cases. Nasse states generally that, in from one-sixth to one-eighth part of the cases of Hydrocephalus, tubercles are found in the head. According to my observation, the most frequent form assumed by tubercular matter in these circumstances is that of lardaceous patches along the course of the large vessels at the base of the brain and along the fissure of Sylvius. In three instances, I have found tubercular masses amounting to the size of a walnut in the cerebellum; and in one instance a mass occupying the centre of the pons Varolii. Cruveilhier has depicted a similar example in his "*Anatomie Pathologique*."

Morbid appearances presented by the Thoracic and Abdominal organs.—It is needless to mention all the various morbid appearances that have been noticed by different observers in the thoracic and abdominal organs, since many of them are evidently of merely accidental occurrence.

But the frequency of tubercular deposition in other organs besides the brain is a question of great

importance; and, considering the very general admission of the connexion between scrofula and Hydrocephalus, it is remarkable that so little attention should have been paid to the state of the thoracic and abdominal organs with reference to the existence of tubercular disease. Of 30 cases, in which these organs were examined by Gerhard, 29 presented tubercles in the lungs, bronchial glands, or some one of the abdominal organs; and in 18, out of 19 cases examined by Dr. Green, tubercular deposit was discovered in some one or other of the above organs. Of the 20 cases given by Schweninger, tubercles were found, in every instance, in one or other of the internal organs; and, in 4, they were found in *all* the great cavities. So that, out of 69 cases examined with care, in 67 tubercles were found in different parts of the body.^x It is, of course, impossible to tell the proportion of cases in which tubercles are met with, unless we are sure that all the principal organs have been examined. I therefore abstain from attempting to gather from other sources further statistical evidence in support of these important facts. Abercrombie, Bright, and Martinet, all make frequent mention of the occurrence of tubercles in the thoracic and abdominal organs. Dr. Cheyne says, "I have found the surface of the liver studded with small white tubercles not larger than a grain of mustard-seed. The glands of the mesentery are often diseased, as evidenced by their enlargement

x Sind Scropheln = Tuberkeln? Findet man nicht auch bey den an andern Krankheiten verstorbenen Kindern in einem oder dem andern Organ achnliche ablagerungen?

and the caseous depositions which we find in the substance of the glands." * Cruveilhier mentions the occurrence of tubercles in all the more important organs in connexion with Hydrocephalus.† In the greater number of the cases recorded by Senn and Charpentier under the title of "Meningitis," the lungs were tubercular. In at least 12 instances I have myself found tubercles, either in the brain, chest, or abdomen.

The proportion in which the different organs were affected in the 20 cases given by Schweningen will be seen from the following table; from which it appears that the bronchial glands are the most frequent seat. Now, it is only latterly that attention has been directed to these glands as the most frequent seat of tubercles in young children, and even in the present day they are more frequently left unobserved than any other parts; so that it is easy to understand how the presence of tubercles within the chest should have been overlooked in many cases where they really existed. The following is the table referred to of the 20 cases of Schweningen:

The Bronchial glands contained tubercles in	17
The Lungs	15
„ Spleen	10
„ Mesenteric glands	7
„ Liver	7
„ Brain	4
„ Pleura, peritoneum, stomach, and kidneys, each	1

* Essay, &c., p. 32.

† Anat. Pathol. liv. vi. p. 7.

In more than half the cases examined by Nasse, he states that he has found crude tubercles in the lungs; and in the bronchial glands sometimes, when there were none in the lungs. Out of 30 cases, four times in the spleen, three times in false membranes covering the liver, and twice in the parenchyma of that organ. The mesenteric glands were enlarged in 4, and contained tubercular matter in 3.*

The *liver* was the seat of morbid appearances in many of the cases given by Dr. Cheyne. He speaks of it as of a bright red colour on the surface, abounding in minute vessels and sometimes extensively adhering to the peritoneum, and in several instances studded with small white tubercles.† Dr. Thompson states, that, of 11 cases, 9 presented indubitable marks of previous inflammation of the liver.‡ In addition to the tubercular granulations present in seven of Schweningen's cases, the liver was in six instances unusually hard and dense, in three very dark-coloured, and in two presented patches of a light yellow colour on its surface. In only two instances among my own cases have I any *record* of the liver presenting any particular marks of disease; in these cases it was greatly enlarged, but not apparently diseased in structure. A similar state of the liver is also mentioned by Dr. Bright.§ This simple enlargement of the liver

* Untersuch. &c.

† p. 31.

‡ Lond. Med. Reposit., vol. i. p. 16.

§ Op. cit. p. 39.

appears to be merely a continuance of the foetal condition, which is not very uncommon in scrofulous children.

Stomach.—Softening of the mucous membrane of the stomach, with more or less thinning of the coats, particularly towards the great *cul-de-sac*, is very commonly met with in Acute Hydrocephalus. “This alteration of the stomach,” says Ruz, “was usually very extensive, and was so constantly remarked in all cases carefully observed, that it appears to be one of the most remarkable of the secondary lesions attending the disease.”* In seven of the cases observed by Schweninger the great *cul-de-sac* was so thinned and softened as to be readily perforated by the finger. But this gastric lesion did not appear to hold any definite relation to the duration of the disease, nor to any particular appearance within the head; the only cerebral lesion that constantly attended it was the effusion into the ventricles. Nasse met with this condition of the stomach only twice; and says, that, notwithstanding the frequency and often the urgency of the vomiting, he generally found the stomach quite healthy.†

This gastric softening is certainly an important and interesting fact, as illustrating still farther the scrofulous diathesis prevailing in at least a large number of the cases of Hydrocephalus;

* Thesis, p. 20.

† Op. cit. p. 469.

for a similar condition of the stomach, it is well known, is a characteristic lesion in other scrofulous affections, particularly phthisis; and though, as yet, the exact relation which it holds, either to the vomiting, the epigastric or abdominal pains, or the frequent craving for food, has not been discovered, its very frequent association with these symptoms must be considered an important fact. That in many instances it is doubtless a *post-mortem* lesion scarcely diminishes its importance when we consider how much more frequent it is in certain diseases than in others.*

Intestines.—The lesions most frequently met with in the intestines are tumefaction and ulcerations of the mucous follicles, and a contracted state of various parts of the bowels attended frequently by intus-susception. Thompson,† Coindet,‡ Mills,§ Bright,|| and Abercrombie,¶ with many others, have noticed the occurrence of intus-susception. Dr. Bright seems disposed to look on it as resulting from the irritation produced by calomel. Dr. Abercrombie is inclined to attribute it to an inversion of the peristaltic action of the bowels, arising in the same way as the urgent vomiting from the disease in the head. The mucous follicles, particularly the glands of Peyer, were tume-

* It is questioned by some, whether it is not, in all instances, a consequence of the *post-mortem* action of the gastric juice.

† Med. Repos. vol. i. ‡ Op. cit. p. 110. § Case 3.

|| Case 15. ¶ Op. cit. p. 150.

fied, of a darkened colour, or otherwise diseased, in 15 of the 20 cases of Schweninger. Similar appearances, indicative of various degrees of inflammation, have been noticed by Dr. Abercrombie and most others.*

It should, however, be remembered that Hydrocephalus not infrequently comes on in the course of disease of the bowels, and, therefore, the morbid appearances that have been noticed in the intestinal canal must often be regarded as the results of previous disease rather than of the head affection, or of the general state of system on which it depends; but, however induced, it is important, with reference to the treatment, to remember that gastro-intestinal inflammations often coincide with cephalic disease, particularly with meningitis of the base.

The *kidneys* I have seen extensively disorganised from scrofulous degeneration, and in one of Schweninger's cases they were found tubercular.

* e. g. Case 47, op. cit. 3rd edit.

CHAPTER IV.

ÆTIOLOGY OF HYDROCEPHALUS.

“IN a large proportion of the cases of inflammatory affections of the brain,” says Dr. Abercrombie, “the causes elude our observation.” In this, most will be disposed to concur, and it applies with unusual force to Hydrocephalus.

It is evident, from the very disproportionate frequency of Hydrocephalus in childhood as compared with adult age, that the periods of infancy and childhood are the most important of the predisposing causes. What then, it may be asked, are the physiological conditions and relations of the brain, in the earlier periods of life, which render it so prone to Hydrocephalus?

The peculiar condition of the brain during infancy has hardly received that attention which it deserves in discussions on the causes of such an affection as Hydrocephalus. It is not till many months after birth that the brain acquires even the general form and organisation which it is destined to have during the rest of life; and not until much later that its intimate structure and relations are such as to fit it for the functions it is

to perform in adult age. The gradual manifestation of the mental faculties, the progressive developement of intellect, which form a subject so wondrous and delightful for the contemplation and admiration, not merely of the parent, but of all thinking and rightly constituted minds, are the attendants of corresponding alterations in the organisation of that structure by which mind is manifested. It cannot be doubted, that the successive changes in the cerebral substance, which are appreciable by our senses, are connected with important alterations in its functions. The line of demarcation between the cortical and medullary substance, at birth scarcely perceptible, becomes gradually more and more distinct; but the cortical substance, passing successively through different shades of pink and red, becomes at length brownish, and finally of its permanent reddish-grey colour. It is not, in fact, till the infant has completed its first year that the organisation of its brain has acquired even the general and more palpable characters of the adult. Till this period, it is in a manifest state of transition. Now, though subsequently to this period the changes in the structure and appearance of the brain are not so manifest or easily recognisable, there can be no doubt that it is still the seat of constant and important changes that are to fit it for its new functions, not merely for the developement of the mind, but also for the important reciprocal in-

fluences exercised between it and the rest of the organisation, and of which it is destined to be the centre. "For not only does the brain of the infant during the first year undergo important organic modifications, but the exercise of its functions is constantly increasing; it progressively acquires its empire over the other organs, it gradually becomes fitted to receive from them those sympathetic radiations to which it had hitherto been a stranger, it becomes the actual centre and regulator of sensations, and this influence is felt even in disease. We find, in fact, that during the first days of life the most serious changes take place in the midst of organs, unaccompanied by any febrile disturbance, any general symptom, or any morbid sympathy: but, at the age of which we speak, everything assumes a new aspect; fever, that is detected with the greatest difficulty in newly-born children, is now lighted up by the slightest cause; thence the agitation, the cries, the spasms, the nervous mobility, so common, so easy to excite, and at the same time so temporary in children after this age."* Now, it is precisely at this period that the tendency to Hydrocephalus begins to manifest itself. Below the age of one year, but few cases occur, and from this time, up to the seventh or eighth year, the disease increases in frequency. At this era other changes have taken place in the

* Billard, *Maladies des Enfants*, &c., p. 602, 2dième edit.; Paris, 1833.

physiological and anatomical conditions of the brain, and Hydrocephalus becomes less common. The great preponderance of aqueous matter in the cerebro-spinal system has diminished, a greater density has been acquired, and the quantity of phosphorus, which appears to be an essential ingredient in the constitution of the brain, is considerably augmented. It is evident, therefore, and will be farther seen by referring to the chapter on Statistics, that the physiological conditions attending the first septenniad of life exercise an important influence as predisposing causes of the disease.

But, besides the abundant evidence we have of the peculiar susceptibility to impressions, both external and internal, of the brain and nervous system in general of children after the age of one year, the influence of particular remedies, more especially opium, is sufficient to shew that there are peculiarities in the constitution of the brain of children by which it differs materially from that of the adult. The marked susceptibility to the narcotic effects of opium is so well known as to have led to the almost entire abandonment, by many practitioners, not only of opium, but of almost every other sedative or narcotic. Whether this dread of such remedies in the treatment of infantile disorders may not have been carried too far, is, I think, more than questionable.

Of the same fact mercury affords another illustration, but of an opposite kind. The non-suscep-

tibility of children to the specific effects of mercury is very generally admitted ; whilst as a purgative it is better borne, and far more useful, generally speaking, than in adult age. “ It is impossible in many cases to reason,” says Dr. John Clarke, “ analogically from adults to children respecting the operation of medicines. Children not only bear, but require, much larger doses of purgative medicines in proportion to their ages than adults do, and the effect of them is very different. Opium, on the contrary, in very minute doses, is often productive of very violent effects in children.”

“ It is not at all known at present upon what these peculiarities depend, but there are few things better ascertained in practice.”* Admitting, however, the difficulty of explaining fully these peculiarities, there needs be little hesitation, I conceive, in attributing them, in some measure, to differences of constitution of the nervous system.

From these and other similar facts, it is evident that the intimate structure and physiological properties of the brain in infancy and childhood are peculiar, and must exercise an important influence over the pathological manifestations of its action. In a great degree, the precise nature of these peculiarities must be hidden from us ; but with some we are acquainted, and their consideration is important in connexion with the ætiology of Hydrocephalus. The rapid growth and perpetual activity of the

* Commentaries, p. 181.

brain after one year, rendered necessary for the acquirement of knowledge and for the government which it is designed to exercise over the growth and functions of the whole system, sufficiently account for much of the proneness manifested by children to cerebral disorders; and the preponderance of the arterial over the venous system in the early periods of life will still farther explain the readiness with which any cause of irritation gives rise to excitement of the brain.

There are many facts which warrant the belief that a simple excess of nutrition of the brain may be the original and essential cause of Hydrocephalus; at least, of the more chronic forms. In Hydrocephalic foetuses the expansion of the cerebral mass and the effusion of fluid are attended by a manifest increase in the actual size, not merely of the brain, but also of the bones of the cranium: and it has long been a remark, well founded, that those children are most exposed to Hydrocephalus who have large heads; in whom, in fact, the nutritive functions of the brain are carried to excess. Such excess of vital energy may doubtless be both a cause and an effect of excessive mental energy: but, in many instances, it is a simple excess of nutritive energy that is the cause of the inordinate activity of the special functions of the brain; which however, in their turn, react on the functions of nutrition. But that there is also, in many cases, an original difference in the quality of the nervous

matter, a congenital preternatural mobility of nervous substance, I have myself no doubt; and that thus, from over-activity of the cerebral functions, may arise an excess of nutritive function. This, in adult age, less readily takes place, in consequence of the altered anatomical relations of the brain and its containing parts. Hence, in adult age, vascular activity, resulting from hyper-activity of the cerebral functions, instead of leading to increased nutrition, more frequently induces symptoms of congestion, or of active inflammation. We have, however, hypertrophy of the brain in adults, resulting from over-nutrition; though such instances are rare, and the mode in which it is induced obscure. In other instances, the complete subversion of the mental faculties, mania, is the still more lamentable consequence of the same state of things. Whenever there is great functional activity, and especially if associated with much susceptibility of the nervous system, there must be a great tendency to disordered circulation. Trifling causes will disturb the due balance between the different parts of the circulating system, and will induce temporary congestion, or excitement of the capillaries. Hence we constantly find that irritation of the peripheral extremities of the nerves in children gives rise to temporary derangements of the circulation, which would not usually follow the same causes in adults. The frequent recurrence of these sources of irritation, and their effects, will undoubtedly

still farther predispose the capillaries of the brain to take on morbid action, and particularly of the kind which terminates in inflammation. In this way, undoubtedly, we are to explain the very frequent concurrence of Hydrocephalus and the process of dentition, the existence of worms, and other causes of intestinal irritation. Hence also errors of diet, by the derangements of the circulation which they induce within the head, (often sudden and severe in their character,) may lay the foundation for permanent and more serious disease. Improper food, by perpetually irritating the mucous membrane of the bowels, doubtless often acts, through the medium of the spinal cord and the brain of children, in a most injurious way. It is through the spinal cord that irritation attendant on dentition also acts. The influence of this cause of irritation is by Dr. John Clarke considered so great, that he says, "It is a fact, the truth of which is easily ascertained by observation, that, in families where several children have fallen sacrifices to Acute Hydrocephalus, if a child should survive the age of dentition, it is rarely afterwards attacked by phrenitis." It has been frequently noticed, that children of precocious intellects and unusually lively disposition are prone to Hydrocephalus: and it is a question worthy of serious consideration, whether the attempts now made to push the intellectual education of children at an early age, be not one of the causes of the increased frequency

of the disease; for it is not merely the intellectual excitement, which is often productive of serious harm, but also the attendants on this early mental training; the confinement in heated rooms, the want of due exercise and exposure to the open air, are all powerful causes productive of that irritability and weakness of frame, which are the sources of many diseases.

The same peculiarity and susceptibility of nervous constitution to which we have alluded, will doubtless render the brain more sensitive to the influence of various changes in the constitution of the blood, arising from protracted derangements of the more important excretory organs. Hence defective exercise of the biliary, urinary, and cutaneous functions, if long continued, independent of the general disturbance of system which they produce, may, through the direct influence exerted by the morbid states of the blood attendant on such functional derangements, become the causes of cerebral disorders. It appears to me more than probable that this is the true reason why cerebral disorders are of so frequent occurrence after certain of the exanthemata. Exposure to cold is, undoubtedly, the determining cause of the developement of the cerebral affection in the large majority of these instances; but, if we look carefully at all the attendant pathological circumstances in these cases, we shall, I think, see good reason for believing that a morbid condition of the blood, and consequently

of the nervous matter, are powerful predisposing causes.

The frequent occurrence of cerebral disease after the suppression of accustomed evacuations may generally be sufficiently explained, by the well-known derangements of circulation which are apt to succeed to such events: and, therefore, on the philosophical principle of not seeking for farther explanation of a phænomenon when we have already found a sufficient cause, it is needless, perhaps, to inquire whether changes in the constitution of the blood, as well as in its distribution, may not also have some influence in many of these cases.

Knowing, as we do, the injurious influence of retained secretions exerted on the nervous system, and particularly of the bile on the brain, there is certainly nothing improbable in the supposition which has been often entertained, that deranged action of the liver is one of the most frequent predisponent if not exciting causes of Hydrocephalus. Such an opinion receives confirmation from the frequency of hepatic derangements in children, especially in those of strumous habit, in whom we often find the liver retaining its foetal condition; and, though this state of the liver may be manifested, only by its retaining the disproportionate volume to the rest of the viscera, it is fair to assume, that, when the healthy changes in its organisation are not effected, there is a corresponding defect in the performance of its functions. Organic

changes in the liver are not, however, of so frequent occurrence in connexion with Hydrocephalus as some have represented; but I have met with some marked examples of enormously large livers in cases of a sub-acute verging on the chronic character. In one instance, in which the *post-mortem* appearances within the head were of a decidedly scrofulous character, the liver and spleen were so enlarged as to extend to the pubes on one side, and considerably below the umbilicus on the other.

It is, perhaps, difficult to say what may be the exact nature of the connexion between hepatic derangements and cerebral disease in children; whether they ever stand in the relation of cause and effect, or whether they are merely frequent concomitants depending on the same general derangements of system: but there can be no doubt that their co-existence is of sufficiently frequent occurrence, and the well-known reciprocal influence of the brain and liver of sufficient importance, to warrant special attention to the state of the liver, both when laying down plans for prophylactic treatment, and when discussing the pathology of Hydrocephalus.

But, of all the predisposing causes, scrofula seems to be by far the most important. After the mass of evidence which has already been adduced in proof of the very general prevalence of the scrofulous diathesis among children who die of Hy-

drocephalus, it is quite unnecessary to dilate here on this point.

I would, however, entreat all who are anxious to render the treatment of this disease more successful than it has hitherto proved, carefully and fully to consider the amount and variety of evidence we now possess on the connexion of scrofula with Hydrocephalus; for, notwithstanding the distinct though general statements made on this point by some of our best writers, more particularly Cheyne, Sprengel, Bright, and Abercrombie, and notwithstanding the more recent and detailed evidence afforded by the investigations of Ruz, Gerhard, Green, Schweninger, and others, I feel no hesitation in stating my belief that this very important fact is either not generally admitted by the profession in this country, or has not received the consideration which it deserves.

If the influence of a scrofulous constitution be taken into due consideration, we shall have no difficulty to account for the hereditary tendency to the disease. The evidence of hereditary predisposition is so striking, that it has been admitted by almost every writer, since Whytt first directed special attention to the disease. Cheyne, Carmichael Smyth, Dr. John Clarke, Underwood, Gölis, and Bright, among many others, may be mentioned as having adduced the most irrefutable evidence of this hereditary predisposition. "I have known," says Dr. Underwood, "six children born of the same

parents die successively of it at the age of two years, five of whom were afterwards opened.”* It is not pretended that this hereditary predisposition invariably consists in a scrofulous diathesis; but, when we have no proof of this, there is often sufficient evidence of a state of constitution closely allied to scrofula and leading to it.

If the parents themselves have not been the subjects of scrofulous disease, they are often found to be of a weakly habit of body, or to have been suffering from debilitating causes at the time of conception. Thus, in one instance, when inquiring into the probable causes of the disease in a child that I was attending, and which ended fatally, I found that the parents had already lost three children from the same affection, though neither father nor mother had manifested any scrofulous tendency.

Gölis has given a remarkable statement with reference to the influence of the mother on the foetus. “Multiplied experience,” he says, “of the influence of terror and anxiety in the mother during the latter period of pregnancy was afforded me and the other physicians of Vienna in the year 1809, when our imperial city was bombarded. Most of the children who were born after this frightful catastrophe, in about ten, twenty, or thirty days after their birth, were seized with convulsions and died. Within the cranium were found traces

* P. 298, 9th edition.

of inflammation, and in the ventricles of the brain effusions of lymph and of serum." *

"It is quite true," as Dr. C. Smyth states, "that sometimes children apparently in the best health and spirits are suddenly seized with the disease;" but, as he farther observes, "in the greater number of cases its origin may be traced to bad nursing, improper food, hard water, dentition, or other debilitating causes, or to some previous disease by which the child's strength and general health have been impaired." †

This quite accords with my experience. Indeed, I do not know that I have ever met with more than one instance of the disease in which, where an hereditary scrofulous predisposition might not fairly be presumed to have existed, the child had not been exposed to the influence of some serious debilitating cause; that is to say, when the disease was of the more ordinary character described under the first variety. We have good evidence from *post-mortem* examinations that scrofulous action may be going on in the system with most of the external signs of good health. But, on the other hand, I am quite aware that *really* healthy children may, from particular exciting causes of more than ordinary severity, become the subjects of Hydrocephalus. In such instances, however, it will be found that the disease assumes rather the character

* Gooch's translation, p. 76.

† Op. cit., p. 63.

of sthenic inflammation, and differs considerably from the more ordinary type.

But the majority of Hydrocephalic children, according to my observation, present those characters of constitution which sufficiently bespeak a deficiency of tone and vital energy; and here, again, I gladly avail myself of the authority of Dr. C. Smyth, whose little treatise, it has been truly said, contains many profound and correct views of Hydrocephalus. "Children," he says, "of a fine clear complexion, lively or sprightly disposition, having a peculiar softness of the muscular fibre, who are easily lowered by evacuations, and fatigued by exercise, those especially who are of a cold, languid habit, where there is a feeble action of the heart and a want of vital energy, are, from what I have observed, more subject than others to this disease." * Dr. Cheyne, however, states that he has seen the disease oftener in children of dark eyes and dark complexion. But, whatever be the particular temperament most prone to the disease, a wan, pallid, sickly aspect is, I think, very generally to be observed.

If these views of the general state of system predisposing to Hydrocephalus be correct, we need not be surprised that it should so frequently follow such diseases as hooping-cough, scarlatina, measles, remittent fever, difficult dentition with protracted diarrhoea, &c., by which the system is often so seriously

* P. 62.

debilitated; and in the same way we may explain the much greater frequency of the disease among the badly-fed children of the poor.*

In stating a scrofulous disposition to be the grand predisposing cause of the disease, I include of course a number of important causes which would otherwise demand more particular notice. The influence, for example, of crowded ill-ventilated dwellings, poor insufficient food, imperfect protection from the weather, and, in brief, all those causes which are well known to favour the developement of struma, must be considered as powerful in the induction of Hydrocephalus. In proof of this I need but refer the reader to the chapter on Statistics.

The *exciting causes* of the disease are, certainly, in the majority of instances, of much more difficult detection than the predisposing. *Falls and blows*

* Among the fearful forms of disease induced in the Milbank Penitentiary at the time of the noted epidemic in that institution, so well described by Dr. Latham, affections of the brain and nervous system were frequent. The affections of this kind, says Dr. Gooch, "which came on during this faded, wasted, weakened state of body, were headache, vertigo, convulsions, apoplexy, and even mania. When bleeding was tried, the patients fainted after losing five, four, or even fewer ounces of blood, and were not better, but perhaps worse. Leeches to the temples were equally useless: in some cases these patients died very slowly, after the circulation had remained, for a day or two, almost, though not quite, extinct; yet, on examining their bodies after death, there was found increased vascularity of the brain, and sometimes fluid between its membranes and in its ventricles." *Dis. of Women*, p. 146, 2nd ed.

are, according to my observation, the most frequent exciting causes; but I cannot agree with Dr. M. Hall, that there is any decided difference in this respect between the more purely inflammatory forms of the affection and those which are more decidedly of a scrofulous character. External violence is as often an exciting cause of the one as of the other form. Some of the most distinctly scrofulous forms of the disease I have traced to falls or blows. In the treatise of Martinet and Parent Duchatelet I find, however, only three cases out of thirty-three of meningitis in children traced to external violence as the exciting cause; but the remark of Dr. Abercrombie, with respect to external injury as a cause of cerebral inflammation in children, is very just and important. "Injuries," he says, "are a more frequent cause than we are generally aware of, particularly in children; the injury being often slight, and the interval very considerable between it and the appearance of any alarming symptoms."* In one case, that occurred in my own practice, the interval between a severe fall in the court-yard and the occurrence of alarming symptoms was six months; though, from the period of a few weeks after the fall, the child had been observed to be ailing. Gölis also, who mentions various forms of external violence among the exciting causes, lays great stress on them, and states that the Hydrocephalic symptoms often do not come on till after many weeks. His statement

* Op. cit., p. 148.

he also confirms by the testimony of various other German physicians. Dr. Cheyne, in criticising the statement of Rush attributing the disease to the direct consequence of external violence, says, "With extensive opportunities of seeing Hydrocephalus, I have not met with one instance of its having been directly, and, I believe, only one where it was indirectly, occasioned by external violence." Dr. Cheyne, however, admits having met with instances where the disease was *attributed* to violence; but, because a considerable interval elapsed between the accident and the occurrence of Hydrocephalic symptoms, he argues that the accident, as an exciting cause, "must go for nothing." But, in a subsequent passage, he admits that "sometimes after an accident there has been observed a drooping state long before the brain is palpably affected;" and says, that he does "not mean to affirm that injuries of the head never give rise to Hydrocephalus," but merely contends, that, when they do, it is only intermediately, "by calling into play what, from a good and fortunate management, had hitherto been latent, I mean a scrofulous condition of system, which I have repeatedly seen to follow a severe accident, and which wonderfully favours the establishment of Hydrocephalus." In granting thus much, however, Dr. Cheyne admits all that would be contended for in most instances. This, at least, is all that I should be disposed to contend for, that external violence is the determining cause of that morbid action to which

there is already a predisposition. It is curious, however, to see how variety of opinion with regard to the nature of the disease modifies the views which different observers take of the influence of particular causes.

Anything which induces *violent commotion of the brain* acts probably much in the same way as absolute violence. Such causes Gölis considers the most important of all those inducing the disease in large, perfectly healthy, lively children; and states, that the greater part of those he had treated came by the disease in this way. The thirty-ninth case in Martinet and Parent Duchatelet's work is a well-marked instance of the disease succeeding to fright. A girl seven years of age was ill-used, and threatened to be put in a dark place; which so frightened her, that she was seized with convulsions of the face, which were speedily followed by general convulsions, stupor, and the symptoms of the latter stages of Hydrocephalus. Dr. Alison also says, "We have seen several instances of children in which a sudden fright has acted most distinctly as the exciting cause of the disease."* Most, who have seen much of the diseases of children, must have met with instances in which convulsions have been distinctly caused by fright; and, in some cases of Hydrocephalus that have fallen under my own notice, there was good reason to believe that mental commotion was the determining cause.

* Brit. and For. Rev., April 1837, p. 310.

There are many striking examples on record of sudden, violent, moral disturbances so affecting the milk of nurses as to bring on convulsions in children at the breast, but I am not aware that Hydrocephalus itself has been traced to such causes.

Severe physical exercise, *e. g.*, running, has also been followed by the immediate accession of the first symptoms of Hydrocephalus, — headache and vomiting.*

Most practitioners, probably, have met with the disease coming on *during* hooping-cough, when the brain is frequently subjected to sudden and severe disturbance of its circulation.

Vomiting has also been mentioned among the exciting causes; but I have not been able to discover that there are any very good grounds for this statement.

Inflammation of the mucous membrane of the bowels, so frequent about the period of weaning, after reducing the system to the utmost degree of debility and exhaustion, is often observed to terminate in a comatose state of the brain, accompanied by many of the more important symptoms of the last stage of Hydrocephalus. In such cases there will often be found effusion of serum within the ventricles and between the membranes, as well as more than usual vascularity of the coverings of the brain. Phthisis in very young children terminates, I think, more frequently in this than in any other way, and I

* Vide Case 3 in Martinet and Parent Duchatelet.

have frequently found precisely the same appearances within the head. In all these instances, the anasarcaous condition of the membranes at the base of the brain has very much the appearance of inflammation that has been followed by the effusion of coagulable lymph.

Suppressed evacuations, though more often the causes of cerebral affections in adults than in children, are in these not infrequently the immediate cause both of simple effusion within the head and of inflammatory action, terminating fatally, sometimes in a very short time, and with various degrees of effusion. The sudden disappearance of eruptions, and of scrofulous and other sores on the head, have often been observed to be followed by Hydrocephalic symptoms. Cases occasionally occur, during the course of acute diseases of the bowels in children, which, as Dr. Abercrombie observes, seem referable to the sudden diminution of the urinary secretion, and bear an analogy to the disease termed *Ischuria renalis*. Several interesting examples of this kind are given by Dr. Abercrombie. It is still doubtful in what way the disease is excited when it occurs soon after the disappearance of measles, scarlatina, and small-pox; the peculiar condition of the cutaneous and urinary functions at these times has probably much to do with the production of the cephalic symptoms, but I am more disposed to refer the exciting cause in these cases to the next head.

Cold has been shewn under the head of Sta-

tistics to be an important exciting cause. Sudden changes of temperature, whether from heat to cold, or from cold to heat, are well known to be among the most important of the exciting causes of inflammatory diseases in general, as well as of cerebral congestions. There is, however, much less proof of the injurious influence of heat as an exciting cause of Hydrocephalus than there is of cold. Gölis considers the injudicious exposure of infants, and the application of cold to the head, frequent exciting causes.

The evidence throughout all climates is uniform in regard to the influence of cold in favouring cerebral congestion, the frequency of which increases with the diminution of temperature. In Holland,* Rome,† Turin,‡ Paris,§ and in this country,|| taking the average of a number of years, it has been clearly ascertained, that, in respect to the frequency of cerebral congestions, winter is the season that stands first in order. Sudden transitions from one extreme of temperature to another have also been found to be attended by an increased frequency of the same diseases. The conclusions derived from the tables I have already given, shew that Hydrocephalus also is more frequent in the colder months than in the hotter.

There is an unusual susceptibility to the injurious

* Annales d'Hygiène Publ. et de Méd. Leg. ii. 234.

† Baglivi.

‡ Annales, &c. loc. cit.

§ Fabret.

|| Farr, Reg. Gen. Reports.

action of cold after all febrile disorders, and especially after the exanthemata, when the functions of the skin have been much deranged ; but it is probable that other important circumstances predispose the system to take on inflammatory action after the exanthemata, particularly after scarlatina. The cases of Hydrocephalus occurring after this latter disease are frequently, or rather usually, associated with that general dropsical tendency which in many epidemics prove more fatal than the original disease.

There is much reason to think, that, among the poor, the disease is often induced by the improper use of *narcotics*, and by the iniquitous practice of giving to young children ardent spirits for the sake of their narcotic effects.

But, after all, it must be confessed that the exciting causes of Hydrocephalus often entirely elude our research ; and, though long lists are given by some authors, there seems little reason for viewing many of the causes as anything more than occasional coincidents. In the brief statement already given it will, I think, be found most of those causes are included of whose injurious influence we possess any decided or satisfactory evidence.

CHAPTER V.

PATHOGENY.

THE inflammatory nature of Acute Hydrocephalus, it has been said, "has become a household creed;" and it may seem useless, as well as presumptuous, to question what has been admitted by the first authorities. Gölis, for example, states, that "not only serum, but likewise coagulable lymph, is effused within the brain; and in 180 bodies of patients who died of Acute Hydrocephalus, I have always seen coagulable lymph, which covered the upper surface of the brain and lined the walls of its ventricles." * This statement, however, notwithstanding the high character of Gölis, it is impossible to avoid questioning. Were it generally confirmed by the observations of others, it would be decisive; but it is opposed to the results of the investigations of almost all other pathologists with whose writings I am acquainted, even those most wedded to inflammatory doctrines. The probability would appear to be, that Gölis had mistaken serous infiltration of the arachnoid, and the turbid condition of the exudation

* Gooch's trans., p. 169.

Gölis' statement. Inflamed.

from the presence of a certain quantity of broken-down and softened cerebral substance, for the consequences of inflammation. There is no reason for questioning the good-faith of Gölis; but it is evident that he firmly believes in, and warmly advocates, the inflammatory nature of the disease, and it is very possible that he has sometimes fancied he saw what he thought he ought to see, and therefore what he wished to see. The very imperfect, scanty, and unsatisfactory way in which he describes his *post-mortem* examinations is in striking contrast with his admirable description of the symptoms and character of the disease during life; and while, therefore, this screens him from any very extended criticism, it makes us hesitate to give our assent to many of the conclusions which he draws from his cases.

Something, it may perhaps be said, should be attributed to peculiarity of epidemic constitution when Gölis' cases were observed. But they appear not to have occurred within any very narrow limits of time; on the contrary, they seem to have been collected during a long course of years: nor do they appear to have occurred in any one particular class of society, or to have been connected with any endemic cause. Yet, if we take the different series of cases that have been published by different authors, there is so marked a difference in the prevailing characteristics of the disease, that we cannot avoid coming to the conclusion, that it is materially modified by climate, epidemic constitu-

tion, or some endemic cause of general operation in the community among which the cases have been observed.

The descriptions as well as the therapeutic rules given by Dr. John Clarke compel us to conclude that he had seen the disease chiefly, if not entirely, under a particular form, and in peculiar circumstances. It is evident, again, from Dr. Green's valuable researches, that the indications of scrofulous action within the head are more general and decisive among the children dying in the Paris hospitals, than they have usually been found to be in this country; though I am persuaded that the intimate connection of the disease with scrofula has not received that attention from British practitioners which it deserves, and that, therefore, many of its indications have been overlooked.

But, after making all due allowance for difference of circumstances in which the disease has been observed, the evidence of inflammatory action in a large proportion of cases cannot for a moment be denied.

Having, however, made this admission, it does not follow that we are to rest satisfied here, or that we are to put out of consideration, when discussing the pathology, the instances, by no means few or equivocal, in which there is no evidence whatever of inflammatory action having existed. Nor is it enough, when proceeding to the treatment, to know that the *majority* of cases

present inflammatory characters ; for inflammation is not a uniform disease, always possessing the same characters and to be treated in the same way. Into both these errors, however, there has, perhaps, within the last thirty years, been a too general tendency to fall. Because many cases are of an inflammatory character, it has been taken for granted that all are ; and it has been assumed as a natural consequence, that in every case we are to combat the hydra with the lancet, and prompt and vigorous antiphlogistic treatment.

We have seen, however, that in many instances there is no evidence of inflammatory action to be found after death, — cases to which the term Acute Hydrocephalus is strictly applicable, where the only *post-mortem* appearance is an effusion of clear serum. Now, the chief arguments of those who contend that such cases are really inflammatory in their nature appear, as far as I have been able to gather them, to be these : 1st, that the symptoms in these instances have been the same as in those in which undoubted marks of inflammatory action are found ; 2ndly, that, when death takes place in the early periods of inflammatory diseases in other parts of the body, serous effusion is often the only morbid product observed ; 3rdly, that this effusion of serum alone, without any other sign of inflammatory action, may be accounted for by the low degree of inflammation in such cases ; and that, as in the large majority of instances, it is on all hands admitted

that undoubted marks of inflammation are met with, it is a legitimate inference that in the smaller number, or what may be termed the exceptional cases, the disease is equally inflammatory, but modified from particular circumstances, and the more so since these simple forms are of rare occurrence.

To these arguments it may be replied, that, though the symptoms in the disputed cases are, as it is maintained, of the same kind as in the undisputed inflammatory cases, yet the same, or at least closely similar symptoms, occur in circumstances leading to the conclusion that they have been brought on by exhaustion, and give way to remedies of an opposite kind to those calculated to subdue, at least *active*, inflammation. To the second argument it may be objected, that when inflammation proves fatal, leaving behind it simply serous effusion, it is in the early stages, and death takes place rapidly; whereas, in the instances referred to, the duration of the disease is often as long as in many of the other cases where more decisive marks of inflammation are seen, and that it is opposed to all analogy for inflammation to run on for a week, or ten days, or longer, and leave behind no evidence of its existence but effusion of serum; and it is equally opposed to all analogy to find serous effusion the result of inflammation which has proved fatal in the early stage, unaccompanied, as is generally the case in

the instances of simple Acute Hydrocephalus, by considerable vascular engorgement of the parts implicated.

There are, indeed, cases of acute encephalic inflammation, which would, from the symptoms, by many be classed under the head of Acute Hydrocephalus, and which prove fatal in the early periods, leaving behind a trifling degree of serous effusion as the only morbid product: but then there are other marks connected with this serous effusion, and of a kind that correspond with the symptoms during life; for we always find great vascularity, either of the brain or its membranes, a tense and turgid condition of the parts implicated, an evident increase of volume, indications of high vascular action, and determination of blood, which accord both with the symptoms during life and the slight effusion of serum found after death. There is no difficulty, when we compare such appearances with the previous symptoms, in interpreting both aright; but, in the disputed cases, nothing of this kind is seen.

To the third argument it may be replied, that, if the effusion is the result of low sub-acute inflammation, we should expect the symptoms, as in similar cases, to partake of the character of such inflammation, whereas they are often very acute; whilst in other instances, where the morbid appearances after death are really those of inflammation of the character mentioned, the symptoms usually cor-

respond. To the latter part of this argument we would also reply by putting the following question :—Is the inflammation, (when, from the marks it leaves behind, there is distinct proof of its having existed,) in the large majority of cases, primary? or the consequence of previous morbid action, distinct from inflammation, but usually entailing it, as a result of the changes induced within the head? These questions should be satisfactorily answered before we use the evidence of inflammatory action afforded by the large majority of cases in the way it is usually employed.

Now, without pretending that this argumentation is altogether satisfactory, it may be sufficient to shew that the inflammatory hypothesis has been too readily admitted, without due consideration of the grounds on which it has been erected. But the opinion, that the disease is essentially, in all instances, inflammatory, may be farther questioned for the following reasons.

In the first place, the cases of simple Hydrocephalus are really more numerous than some have supposed. In the next place, it is by no means proved that the morbid changes seen in the very large class of cases constituting that form of the disease in which there is softening of the central parts, are the results of inflammatory action: there is, on the contrary, great reason to doubt this, on the grounds that have already been adduced. And if we add to these two classes of cases those in

which the inflammatory marks may, as we shall subsequently endeavour to shew, be considered as in all probability the consequences of secondary inflammation, that is to say, of inflammation set up as the result of prior morbid action in the brain itself, we shall have a large proportion of cases in which there is no sufficient evidence of inflammation being either the original source of the disease, or even the immediate cause of the fatal termination.

There will still, however, remain a large class of cases which from their symptoms we agree to call Acute Hydrocephalus, and that are of a strictly inflammatory nature, presenting after death various morbid appearances, indicative of inflammation of the brain or its membranes, associated with the effusion of more or less fluid into the ventricles.

What then, it may be asked, is the nature of the morbid action in the brain in those cases to which we hesitate to ascribe an inflammatory origin? To answer this question satisfactorily without exceeding the limits of legitimate speculation, is certainly somewhat difficult; but not, I think, impossible.

These, it may be observed, are the cases usually preceded by evidence, more or less distinct, of general derangement of health, and which frequently succeed to debilitating diseases, which are associated with an enfeebled habit of body, and which are the least amenable to treatment calculated to reduce the force of the circulation and subdue the

vital powers. It is in such cases that hereditary predisposition is most strongly marked, and a scrofulous diathesis manifested by tubercular action in various parts of the body. It may also be remarked, that the symptoms, though often presenting, in the latter stages, all the violence and acuteness of the more strictly inflammatory cases, are for the most part of a less acute character at the onset, and are more gradually developed. From these, and similar considerations, it may be fairly inferred, that the primary morbid actions in the brain are rather of an asthenic than sthenic character; that they are of slow and gradual operation, pursuing their course, probably for some time, ere they manifest themselves by any symptoms of a decisive character referable to the brain; and the inference seems equally legitimate that the changes occurring within the head are but a part of a general deviation from healthy action throughout the system.

The present state of our knowledge of the pathology of the nervous system certainly justifies the assumption that various alterations in the vital actions of the brain may take place unaccompanied by any appreciable alteration of structure, and be productive of phænomena closely allied to those which attend different changes in its physical state. Daily observation teaches us, that the brain undergoes many and important changes coinciding with various temporary or permanent alterations

in particular organs, or in the system at large. There are also many facts, familiarly known, which indicate that certain vital peculiarities of the brain are associated with those various states of system considered to intimate a scrofulous diathesis, peculiarities that are evinced in the mental manifestations as well as in the corporeal; and we know that in phthisis, and other chronic diseases, long-continued derangements of the nutrition of the brain are not infrequently succeeded by changes in its other functions, and finally by actual physical alterations.

There is every reason to believe, that, long before the occurrence of any physical change, certain alterations in the nervous matter of a dynamic character may give rise even to those phænomena, which, from their more usual origin, we denominate symptoms of pressure, and the true nature of which we are very far from understanding in all instances.

. When, after death, we find appearances sufficient to justify the assumption that pressure has existed, we are warranted in referring the effects manifested during life to a cause which we have incontrovertible evidence is capable of producing them; but, when no such appearances are to be found, our present knowledge, neither of the physiology nor of the pathology of the nervous system, warrants our assuming that pressure has existed, merely because symptoms corresponding to those which it

is known to be capable of producing, have been present. There is indeed, even in those cases in which a sufficient cause of pressure has been found after death, often so great a want of correspondence between the symptoms and the *post-mortem* appearances, as to force us to admit that something beyond simple pressure is necessary to explain the phenomena. We are compelled to take into consideration the seat of the pressure, and the rapidity, or slowness, with which it has been effected. A small amount of serum, if rapidly effused, will induce symptoms of pressure, when twice the quantity, if slowly and gradually poured out, will be followed by none of these symptoms. We have also abundant evidence to shew that the particular *seat* of the pressure makes a material difference in respect of the symptoms usually considered to denote that state.

Nor are there wanting sufficient facts, unconnected with the present subject of inquiry, to prove that particular conditions of the nervous matter, not manifested by any appreciable physical changes, are attended by many of those alterations in sense, thought, and voluntary motion, that accompany pressure. And without alluding to those examples of derangement and complete suspension of the functions of the brain, arising from the influence of various poisonous agents, (narcotic poisons, venous blood, urea, &c.) I may refer to various instances of coma, the most complete, attending

exhausted states of the system, and those usually described as hysteric coma, in proof of the alterations and suspension of the functions of the nervous system, that may be induced from hidden, imperceptible changes in the nervous matter, without any assignable cause of pressure, or appreciable change of structure. It has already been sufficiently proved, by Dr. Abercrombie* and many others, that, in the affections we are considering, all the symptoms of pressure on the brain may be present, with no other change than a degree of softening of the central parts, and without any effusion; and, on the contrary, it is certain that softening and complete disorganisation of the same parts sometimes exist, not only without symptoms of pressure, but without *any direct* cerebral symptoms.† We have no means of deciding, in the present state of our knowledge, on what these remarkable differences depend; the facts, nevertheless, are all-important in any discussion on the pathology of cerebral diseases.

With regard to the symptoms of *irritation* attending the earlier stages of the forms of Hydrocephalus now under consideration, it certainly is not necessary to assume the existence of inflammation, in order to explain them. Similar symptoms are observed, both in adults and in children, in connexion with various states of the brain, *e. g.* in fever, delirium tremens, hysteria, after large losses of

* Op. cit.

† Vide Andral, Clin. Méd.

blood, and in other exhausted states of the system, and are proved by the *juvantia* and *lædentia* not to be of an inflammatory origin. How often do we find headache, morbid susceptibility to the stimuli of light and sound, quickness of manner and of pulse, and even irritability of stomach, come on during the convalescence from any disease by which the system has been exhausted, indicating excitability of brain, that is best allayed by nourishment, and the judicious employment of stimuli or sedatives! In children such symptoms much more frequently have their origin in causes of the kind referred to, than many appear to imagine. In hysterical and hypochondriacal persons they are not infrequent; though, for the most part, they are of temporary duration, as are the causes giving rise to them. In such cases there appears to be an excess of the vital properties of the brain from various alterations in its organic states and relations, so that the slightest stimulus acts with unwonted force; whereas, in the strictly inflammatory states, it is increased stimulation, rather than excess of the vital properties of the brain, which occasions the symptoms of excitement. It has been doubted whether that state of brain termed anæmia, or oligæmia, ever exists. Many of the phænomena, usually considered indicative of morbid excitability of the brain, occur, however, in circumstances that are strongly in favour of the existence of such a state, and the *post-mortem* appear-

ances are often corroborative. In the most simple form of Hydrocephalus, unusual paleness of the cerebral substance, and diminished vascularity, are very frequently, not to say generally, observed; though the larger vessels may at the same time be gorged. These are indeed the only morbid appearances, with the exception of effusion into the ventricles, in most of the cases in question. Now, all such conditions of brain are attended by symptoms of excitement that closely resemble those dependent on inflammatory action within the head.

So far then as regards the symptoms, whether in the latter or earlier periods of Acute Hydrocephalus of the simple form, we must admit that they are capable of explanation on other hypotheses than those of inflammation or congestion.

There can be no difficulty in admitting that the physical alterations of softening, and serous effusion, may be induced by functional and organic changes very different from inflammation, or any allied morbid action. Careful consideration of all the facts connected with the history of such cases and their relation to other forms of disease, naturally leads to the conclusion that alterations of nutrition, and other vital changes, depending, for the most part, on a general scrofulous dyscrasis, are the primary causes both of many of the symptoms of deranged vital manifestations and of the ultimate organic changes. It is in accordance with what we

see in other parts of the body, that long-continued derangements of the nutritive functions should be followed by such vascular derangement as will give rise to relaxation and congestion of the capillaries, and be attended by effusion of serum. Inflammatory action may be the consequence of any temporary excitement or derangement of the cerebral circulation acting on this state of the capillaries, and thus the case becomes complicated with inflammation, in which in fact it often terminates.

The mere presence of effusion in the ventricles, it is probable, may so derange the circulation in the brain, or by its pressure prove a source of such irritation, as will excite inflammation. The anatomical relations between the ventricles and the membranes at the base, perhaps, sufficiently explain why inflammation should be more frequent at the base than elsewhere. In most of the cases that I have examined, in which meningitis of the base has been associated with softening of the central parts and effusion into the ventricles, there has appeared to me no doubt that the meningitis had been of much more recent date than the alterations within the ventricles, that it was a secondary lesion, whatever be the nature of the relation in which it stands to the central disease.

The conclusions, therefore, to which I have been led, are:—That vital changes in the brain, chiefly in the central white parts, of the character probably of tubercular degeneration, are the primary

causes of the simple forms of Hydrocephalus; and that softening, effusion into the ventricles, and meningitis, are all consequences of antecedent alterations of nutrition:—That in some cases derangement and suspension of the cerebral functions may be induced, and lead to a fatal termination, either previously or subsequently to the occurrence of effusion, and, *à fortiori*, before any inflammatory action has been set up:—That, in other cases, it is the secondary inflammation which is the immediate cause of death, and that this inflammation generally partakes of the original scrofulous character of the disease, as manifested by the various forms of tubercular deposition by which it is attended:—That in other cases the scrofulous nature of the disease is intimated by the presence of distinct tubercular masses in various parts of the brain, which lead eventually to a fatal termination by the irritation and inflammation they excite.

The views which Dr. Schweningen has advanced, in the valuable little pamphlet to which reference has so frequently been made, appear to be very similar to those I have just expressed: but even though I should be deprived of whatever merit there may be in the independent opinions which I have been led to form, I gladly avail myself of the support of one whose conclusions have been deduced from a number of very carefully observed and recorded facts, and I therefore beg the attention of my readers to the following evidence ad-

duced by Dr. Schweninger, to shew that on the supposition, that, in the forms of the disease of which we have been speaking, the effusion is the effect of tubercular action, there is nothing opposed to the state of our knowledge on tubercular disease in general.

“ A slight glance,” he says, “ at the symptoms and *post-mortem* appearances of tubercular diseases in general will shew us that nothing is more common than preternatural effusions of serum, either as the product of secretion or excretion. Œdema of the feet and general anasarca frequently occur, not merely in the latter stages, but repeatedly in the course of such diseases. A more abundant secretion of fluid from the arachnoid, and into the ventricles of the brain, is found in phthisical subjects than in those dying of most other diseases. Hydropericardium is also common, as well as œdema of many of the internal organs. But it is as an excretory product that serous effusion occurs in phthisical subjects more constantly, and in the greatest abundance, as seen in the profuse diarrhœa and perspirations ; and it is well known that the diarrhœa in phthisis holds no relation to the lesions of the alimentary canal. The effusion of serum into the ventricles, on the sudden arrest of the diarrhœa, is corroborative of the common origin of the two. If serous effusion be a common occurrence in tubercular disease in general, we need not be surprised that in children it should so frequently occur in the brain (under

the form of Hydrocephalus), an organ which, in childhood, is in a state of high organic and functional developement. This serous effusion may take place slowly, and by degrees, as the result simply of a high degree of the tubercular diathesis; or it may be more rapidly effected, in consequence of the application of some external cause determining the blood to the brain. Thus, in some cases, there is vascular injection, and separation of plastic lymph; or, in other words, meningitis, associated with the Hydrocephalus. This, however, is by no means so constant as to admit of the meningitis being considered the *cause* of the Hydrocephalus. From what has been said, therefore, it results, that Hydrocephalus must be considered as a termination of tubercular disease, peculiar to childhood, analogous to the serous effusions that occur in all tubercular diseases; and that its peculiarity consists in the larger quantity of serum effused into the ventricles than is found in adults dying of tubercular disease, and in the special character of the symptoms arising from the peculiarities connected with childhood." *

The general tendency to serous effusion in scrofulous affections all must have observed; and few, perhaps, would be disposed to deny that the physiological relations of the brain in childhood render it peculiarly liable to become the seat of effusion whenever there exists a constitutional predisposition.

It is almost needless to quote the statements of

* Op. cit., p. 84, et seq.

others who have adverted to the general connexion of Hydrocephalus with scrofula, for this has been forced on the attention of all who have studied the disease. The following remarks, by Dr. Bright, may, however, be quoted as being, to a certain extent, confirmatory of the pathological opinions just stated. "Amongst the results," he observes, "of that defective condition on which the manifestation of this disease (scrofula) depend, certain cerebral affections are very marked; so that there is nothing more frequent than to find the same individual, who is the subject of diseased mesenteric glands, or tuberculated lungs, or tuberculated peritoneum, affected with scrofulous tumours within the skull; and so likewise we see children of scrofulous families, in whom none of the obvious diseases I have mentioned have ever made their appearance, become the subjects of decided head affection. What is the precise essence of the scrofulous diathesis, or how far it depends upon the construction of vessels, or in how far it is to be ascribed to the direct influence of the nerves, still remains a matter for investigation: but that the feeble powers of resisting mischief, which accompany this diathesis, greatly *predispose to disorganization, and more particularly to effusion*, is most certain; and, even when no tubercular disease can be detected, the effusion of serum, in the form of Hydrocephalus, frequently occurs." *

* Op. cit., vol. ii., pt. ii., p. 654.

On the application of any accidental exciting cause, the brain may, in such circumstances, either take on inflammatory action at once, or serous effusion may occur with such rapidity as to destroy life before actual inflammation is induced, the development of which may be indeed retarded by that very effusion of serum. The occurrence of inflammation, or merely of serous effusion, is probably determined by the particular state of system at the time, or the degree of previous alteration in the vital actions of the brain itself.

In conclusion, I would ask, whether many of the phænomena in the affections to which the term Hydrocephaloid disease has been applied, do not favour the views that have been taken of the pathology of that large and important class of cases in which the disease occurs in connexion with scrofula? Whatever may be the nature of the physical condition of the brain, induced by the various causes of exhaustion, the phænomena accompanying it closely resemble those of irritation at the onset, and of pressure in the latter stages; and though, in many instances, when death occurs, it is rather to be attributed to failure of the heart's action than to the state of the brain, in other instances the fatal termination is induced in the same way as in true Hydrocephalus, and we find, after death, effusion into the ventricles. There is also every reason to believe, that, in many instances in which recovery takes place, effusion has really occurred, and been removed by judicious treat-

ment. In such affections there are, then, the symptoms of Hydrocephalus, and the characteristic *post-mortem* appearances, both ensuing on changes in the vital condition of the nervous substance, and temporary alterations in the state of the circulation within the head.

Whether any of the cases of simple Hydrocephalus depend merely on obstructed circulation, as in other dropsies, is, I think, doubtful; but there are some facts on record which render it probable that mechanical obstruction to the circulation through the head has been the determining cause of effusion.

Mere irritation of the brain, it is important to remember, may give rise to congestion, and thus to effusion, which will so far remove the congestion, that after death nothing but the effusion may be seen.

The *consecutive variety* of Hydrocephalus, or that which succeeds to scarlatina and measles, and occasionally to other febrile diseases, is essentially an inflammatory affection, or, at least, demands the treatment adapted to acute inflammation. Whatever forms dropsical effusions succeeding to scarlatina may assume, they are attended by a state of system indicating the existence of an inflammatory diathesis, though actual inflammation may not always be located in any particular part; and it is now fully established, though not so generally known as it ought to be, that such effusions re-

quire a strictly antiphlogistic treatment. The character of the previous disease, and the apparent, if not real debility, together with the pale face, and the frequent absence of any very distinct local symptoms when the dropsy supervenes, are apt to mislead: but the quick pulse, the furred and loaded tongue, the anorexia and thirst, not to mention the evidence derivable from morbid anatomy, are sufficient to prove the existence of febrile action; and the effect of antiphlogistic remedies fully confirms these pathological views.

Although the state of the urinary and cutaneous functions, existing in connexion with these forms of dropsical effusion, sufficiently explain the congested state of the more important internal organs, and thus the disposition to the effusion of serum, it seems probable that the proneness to inflammation, and the first steps in the various functional derangements, are partially attributable to some alteration in the constitution of the blood itself. Subsequently to the more manifest interruption of the renal and cutaneous functions, there is undoubtedly such a condition of the blood as is well known to exert a most injurious influence on the brain and nervous system.

There are, therefore, such pathological conditions existing as readily account for the occurrence of cephalic inflammation, and for the rapid manner in which effusion often takes place, when death does not result from the immediate effects of derangement

of circulation within the head. If there be already a predisposition to Hydrocephalus, or if any exciting cause come into operation by which determination to the brain is induced, the inflammatory and dropsical tendency will be more likely to affect the head.

In what has now been said on the nature of Acute Hydrocephalus purely speculative disquisition has been, as far as possible, avoided. We are then warranted, I think, in drawing the following conclusions:

I. That in many instances the disease consists simply in *inflammation of the brain and its membranes*; the symptoms and the *post-mortem* appearances varying according as the inflammatory action is seated primarily in the substance of the brain, or in the meninges, and according as it is more acute or chronic; and that in some of the most acute forms, rapidly terminating in death, little or no effusion may be found.

II. That in by far the largest class of cases the disease is essentially *the result of scrofulous action*, and may, or may not, be attended by the signs of inflammation: that the most characteristic lesions in these cases are softening of the central parts of the brain and the effusion of serum; but that meningitis, chiefly of the base, is a very frequent secondary lesion, and is usually of a manifestly strumous character: and that, therefore, in this, the

largest and most fatal class, Acute Hydrocephalus is but a modification of scrofulous disease.

III. That there are cases, from their symptoms, hardly to be distinguished from the last class, in which effusion into the ventricles is the only morbid appearance met with after death; and that in these instances the essence of the disease appears to consist in some alteration in the condition of the nervous matter, probably allied to irritation, and that they may, therefore, be said to constitute a purely *nervous variety* of Hydrocephalus.

IV. That there is a class of cases distinct from the above, but closely allied to them, which may generally be traced to some source of exhaustion, either direct or indirect, in which the *post-mortem* appearances are generally indistinct and of a trifling kind, consisting, for the most part, of some degree of congestion of the large vessels, and a little effusion of serum; and that in some of these cases the effusion has probably resulted from injudicious treatment had recourse to with a view to cure an imaginary inflammation: these being the cases described by Dr. Hall and others under the designation of "*Hydrencephaloid Disease*."

CHAPTER VI.

DIAGNOSIS.

HAVING, in the preceding pages, endeavoured to shew that there are various trains of symptoms to which the term Acute Hydrocephalus may be applied; that they occur in very opposite states of system, and are associated with very different conditions of brain; it is evidently vain to attempt, as has often been done, to point out distinctive marks by which to discriminate between an imaginary specific disease and all others. The diagnosis of Acute Hydrocephalus, if we must still employ that term, consists in discriminating, in the first place, between those states of disease in which the morbid actions going on in the brain and its membranes are the causes of the different trains of phenomena presented to our notice, and those in which the cephalic symptoms are but the result of the sympathetic disturbance of the brain from disease in other parts; and, in the next place, in distinguishing between the very various cerebral affections that may give rise to similar trains of symptoms. In both points of view the diagnosis

is, perhaps, equally important; nor are the difficulties greater in the one case than in the other. The non-success also of our treatment, it is probable, has resulted as much, if not more, from failing to discriminate between the different forms of the affection, as from inability to decide with certainty on the existence or non-existence of cerebral disease in its early stages; and we shall, it is to be feared, look in vain for much better success, whether in diagnosis or treatment, as long as either the one or the other is founded on the existence or absence of uniform trains of symptoms. The diagnosis of Hydrocephalic affections must be deduced from a careful consideration and comparison of the previous history, the general condition and aspect of the child, and the relations between the different symptoms; and frequently a careful observer will be decided, rather from a consideration of the *multa quæ nec dici nec scribi possunt*, than from any collection of more formal symptoms.

The grand desideratum, in all cases, is to be enabled to detect the earliest symptoms of cerebral disease at a period when remedial efforts are always attended by most success. It is sufficiently easy to recognise the symptoms of the latter stages when the diagnosis avails only to allow us to save our credit by giving a fatal prognosis. In a practical point of view, therefore, it is far more important to be well acquainted

with those general states of system, and the nature of those symptoms which most frequently precede Hydrocephalic affections, than to be able to decide whether effusion has actually occurred. In the preceding pages I have endeavoured to shew what are the circumstances in which Hydrocephalic affections most frequently occur, and what is the general character of the symptoms by which they are ushered in.

In the present chapter I shall confine myself to the consideration of some particulars calculated to elucidate the diagnosis between the different forms of the disease, pointing out the more important affections for which they may be mistaken, either in consequence of their general resemblance, or of the existence of certain symptoms common to both; and shall endeavour to estimate the comparative value of the more important of these phænomena.

The early symptoms in the sthenic form, or that which might with propriety be called the "encephalitis of children," are in general sufficiently characteristic: they are indicative of high vascular action with manifest determination to the head; there is great excitement of the cerebral functions, preternatural sensibility of the eye and ear to the stimuli of light and sound, a full, firm pulse, and a contracted highly sensitive pupil. There is headache and screaming, starting at the slightest noise or touch, knitting of the brows,

terror, sickness, and vomiting. The skin is hot, the face flushed, the urine scanty, and the bowels confined; there are all the marks of high fever associated with cerebral symptoms indicative of predominant head affection, and that of an acute inflammatory character.

The precursory symptoms in this form are usually few, and scarcely noticed; and in this respect it differs both from the other forms of Hydrocephalus, and from ordinary cases of fever. The symptoms, however, just described, closely resemble those which sometimes precede the eruption of small-pox. During the precursory period, or stage of incubation of small-pox, the patients are usually more or less languid and weak, fretful and restless; the digestive functions are disordered, and complaints are made of pain in various parts of the body. To these symptoms succeed drowsiness in children, with irritability of stomach, and vomiting, headache and giddiness, so that they stagger in their gait, as in the early periods of Hydrocephalus. This, it must be admitted, is a train of symptoms closely resembling that by which Hydrocephalus is frequently preceded. There is, however, one important symptom usually ushering in the eruptive disease, which, as far as I have seen, does not characterise Hydrocephalus, and that is *rigors*. The face, too, is generally pale, and more expressive of anxiety than of pain. But the diagnosis must rest mainly on the results of careful inquiry into the previous history and cir-

cumstances of the child ; and, in many cases, it is ascertained with certainty, only by the subsequent progress of the disease, which in both cases soon removes all doubt.

Generally speaking, however, there is little difficulty in the diagnosis of the acute inflammatory form, even in those cases most resembling continued or remittent fever of an inflammatory type. It is true, that in febrile diseases the attendant nervous and vascular excitement always gives rise to various symptoms of the early stage of Hydrocephalic affections ; but due attention will, in most instances, enable us to discover, in the condition of other organs, sufficient cause, both for the pyrexia and the cerebral symptoms : and in all such febrile affections it is of the utmost importance to remember, that the general condition of the child, as well as particular symptoms, really indicate a degree of danger to the brain, great in proportion to the amount of existing predisposition ; and that, therefore, all indications of cerebral excitement demand the constant and careful attention of the practitioner, in as much as they may at any time become the exponents of a superinduced local affection of the head.

In that form of Hydrocephalus supervening on scarlatina, (and more occasionally on measles,) the diagnosis is not usually attended by much difficulty, though in some instances its approach may be very insidious. Any degree of headache associated with a deficient secretion of urine, especially if it be of

low specific gravity and coagulable, and, still more, if anasarcaous swellings of the extremities have accompanied the headache, or it have succeeded to the rapid disappearance of such swellings, ought to be looked on with very great anxiety, and be met by immediate and energetic treatment. Headache, of a more or less severe and continued character, is the almost invariable precursor of this form of Hydrocephalus; and an acquaintance, not very limited, with this, as well as other forms of dropsical effusion, succeeding to scarlatina, has convinced me, that, whenever it occurs in the circumstances I have mentioned, and is attended by a loaded or furred tongue, and any degree of febrile action, we are warranted in regarding it as indicative of such congestion within the head as will, if not removed, be in all probability speedily followed by convulsions or coma.

It should ever be recollected, that it is not the severe forms of scarlatina that are most frequently followed by this important and dangerous sequela, but the milder forms, in which the rash has been trifling, and that have been attended by little angina, and no affection of the glands. Some exposure to cold will almost always be found to have been the exciting cause of the affection; after which the children suddenly lose their appetite, and complain of more or less languor, and frequently of pains in different parts of the body, and the urine becomes scanty and altered in quality. These symptoms of general derangement of the system are

more marked in some cases than in others, and convulsions, or rapid coma, may come on *apparently* without any of these precursory symptoms, or without headache; and therefore, to a certain extent, the usual statement may be correct, that the form of cerebral affection we are alluding to is often very insidious. But my experience would rather lead me to say, that it was chiefly characterised by the very rapid manner in which it runs its course when once developed; and that the preliminary symptoms referred to, particularly the headache, have always been present, though unnoticed or disregarded. It has not certainly occurred to me to meet with any difficulty in detecting either the precursory symptoms of this form of disease, or in recognising its true nature in the subsequent stages.

The diagnosis, it is on all hands admitted, is often attended by great difficulties in the more gradual, sub-acute, or nervous varieties. We have seen that there is considerable difference, both in the nature and the particular seat of the morbid action within the head; and it is not, therefore, surprising that there should be great diversity in the symptoms: and, notwithstanding all the efforts that have been made to discriminate between the phænomena indicative of the different varieties of cerebral inflammation, and to refer certain symptoms, or trains of symptoms, to lesions of particular parts of the encephalon, it must, I fear, be admitted, that in the present state of our knowledge of

the physiology of the nervous system, we cannot generally, with much confidence, infer from the character of the symptoms what is the precise nature of the morbid action, or the particular locality it occupies. The intimate sympathy that exists between the brain and the rest of the system must ever render it, in some cases, difficult to discriminate between those symptoms of derangement of its functions which are primary, and those which are secondary, and the result of its participation in derangements of other parts of the œconomy. This difficulty also is materially increased by the fact, that certain diseases are, as has been observed in the language of the older pathologists, convertible into each other; that is to say, that, on the one hand, certain diseases, in which the brain is sympathetically affected, often terminate in actual disease of that organ, the original affection either being overcome by the induction of the new one, or so far subdued and modified as eventually to appear as a secondary disease; and, on the other hand, primary disease of the brain may be overcome by the effects of diseased action in another part of the system, originally induced by the cerebral disease. We are thus exposed to many sources of fallacy when judging, either of the true relation of symptoms, or of the nature of the disease as determinable by examination *post mortem*.

These observations are well illustrated by the difficulties that have always been felt in distinguish-

ing between Hydrocephalic affections and the remittent fevers of children. In the early stages of infantile febrile disorders we frequently meet with a train of symptoms very similar to those of irritation attending the early periods of Hydrocephalus; and, in the latter stages, an equally close resemblance to the symptoms of oppression characterising the final periods of the cerebral disorder. Now, what is the state of the brain in the early periods of such fevers? One of irritation denoted by headache, sleeplessness, starting from sleep, irritability of temper, and often delirium. But these are precisely the symptoms by which the first stage of Hydrocephalus is often marked, and when, in fact, the brain is in a similar state of irritation; with this difference merely, that the immediate causes of that irritation are within the head. Now, it is quite manifest, that if, as not infrequently happens, there be already a predisposition in the brain to Hydrocephalus, and the irritation thus secondarily induced be at length succeeded by the more fully developed disease, we are very likely to be led to consider the primary symptoms as the first indications of the cerebral affection; and such has often been the case, and thus the diagnosis of Hydrocephalus rendered additionally difficult.

But to return to the more immediate objects of our attention. Dr. C. Smyth, who has, in many respects, treated of the diagnosis of the simple forms of Hydrocephalus more satisfactorily than

most other writers, lays particular stress on the admixture and alternations of the symptoms of irritation and those of oppression as distinctive of Hydrocephalus. The association of these two classes of symptoms is remarkable, and can hardly fail to be noticed. Extreme irritability of the stomach, denoted by nausea and frequent vomiting, is in contrast with remarkable insensibility of the bowels, as indicated by obstinate constipation. Morbid sensitiveness to light, and sound, and touch, are in opposition to the sluggishness of the pupil and constant drowsiness; whilst the slow breathing and sighing often contrast as forcibly with the quick pulse. Does any other disease present such an association of symptoms?

“I am perfectly aware,” says Dr. C. Smyth, “and readily allow, that many of the symptoms of irritation are caused equally by teeth, worms, or other irritating matters, affecting the alimentary canal; but I do affirm that no irritation occasions the constant combination of opposite symptoms above described.”

There is another general characteristic of the disease, that affords almost equally important aid in the diagnosis, which I would mention before proceeding to the consideration of individual symptoms; and that is, the remarkable fluctuations and variability of the symptoms. The cerebral, the spinal, the circulatory, the respiratory, and the muscular systems, all present the most remarkable fluctua-

constant?

tions in their functions. The children are often in a state of deep coma one day, and the next easily roused and perfectly conscious. The vomiting at one time is perpetually occurring, and at another the stomach shews no evidence of morbid irritability; the limbs are now convulsed, and now paralysed; the pulse for a few hours quick, then falling to the natural standard; now regular, and now irregular and intermitting; the face flushed one moment, and pale the next; and so of all the more important functions.

It is this variability and irregularity of the symptoms that have generally been considered to constitute much of the difficulty attending the diagnosis, and it has even been concluded by some that there is no constancy in any of the symptoms. If, however, we could succeed in discriminating between the different conditions of the brain, we should probably find that there is really more constancy than many have supposed.

Headache, which is so common in almost all affections of the brain, whether idiopathic or symptomatic, is very constant in most forms of Hydrocephalus, and is usually the *first cerebral* symptom. It is, however, often far from being the first observed; in consequence either of its slight character in some instances, or being so very common a symptom in trifling ailments, or owing to the difficulty, in young children, of ascertaining its existence.

gibt nicht für alle Fälle.

Dr. Green states, that, in a sum of sixty-four cases observed at the Hôpital des Enfants Malades, by Senn, Ruz, Gerhard, and himself, headache occurred fifty-three times, and twice it was not mentioned whether it was present or absent. In almost every case given by Dr. Abercrombie, headache, more or less severe, is mentioned. It is stated by Schwe-ninger to have occurred fourteen times in his twenty cases. Whenever the children were old enough to complain, I have always found on inquiry that they had complained of headache, though it had not always attracted attention. In the younger children, I have generally found more or less distinct evidence of pain in the head, with the exception of those cases in which the disease had pursued, up to a certain period, a very chronic course. In such cases I have sometimes been unable to satisfy myself that there had been any headache; and, in others, the most careful questioning has led me to conclude that there had been none. The fretfulness, disturbed sleep, whining or crying, and the peculiar aspect of countenance, indicative of suffering, with some other symptoms, all coincide with the headache, and are referable to the same cause.

The existence of pain, therefore, must be considered very important in a diagnostic point of view. In Hydrocephaloid affections there is rarely any evidence of pain, unless it be screaming; but even this, I think, is not common, except when the child

is disturbed, when the screaming is merely an evidence of the peevish fretful state of the mind: in other cases it is clearly the result of uneasiness of the bowels, or of some other part than the brain.

Stupor, another important and early cerebral symptom, is an invariable attendant on all forms of the true disease, as well as on Hydrocephaloid affections; and therefore, of itself, affords no assistance in the diagnosis of the different forms. Its absence, however, would be to me decisive against the case being one of acute cerebral disease. There is a kind of stupor to which children are very liable when suffering from various febrile affections, and which without a little careful attention may mislead: the child may have a dull listless expression, with the eyes half closed and the pupils dilated, and the parents often imagine that it is unconscious and does not recognise them; but if it be roused, which it generally is very easily, all these symptoms disappear, and there is nothing that deserves more notice than the free and ready manner in which the pupil acts as soon as the little patient is disturbed. This will often remove all doubt in cases that might otherwise be somewhat puzzling.

The *vomiting*, which is so general an attendant, it is difficult to explain; for it occurs at all periods, disappears and reappears perhaps many times in the course of the disease. This symptom, which is indubitably to be referred to the excito-motory

system of Dr. M. Hall, is explained by him on the principle of pressure, which in the early stages, he thinks, may be owing to the tumefied condition of the brain from inflammation: but this explanation does not appear to me at all satisfactory, for vomiting frequently occurs when there is no reason to believe that any cause of pressure exists, *e. g.* in cases of concussion and in syncope; nor is it always by any means proportionate to the degree of inflammation, or of pressure.

But, however the vomiting may be explained, in constancy of occurrence it ranks next to headache and somnolence. Dr. Green states, that, out of sixty-four cases observed by himself and the authors above mentioned, vomiting occurred in fifty-seven. It is mentioned in eleven of Schweninger's cases. Whytt states that he never met with but two cases without vomiting, either in the first, or second stage. If, indeed, we look at any of the various records of the disease, we find vomiting a very constant symptom; and of this every practitioner is aware. Its diagnostic value, however, is greater in proportion as it is strictly spontaneous. I have sometimes thought it most characteristic of those cases attended by effusion of lymph at the base of the brain and around the medulla oblongata; where, in fact, there is most evidence of local irritation at the origin of the par vagum. Irritation of these parts affords, indeed, the most satisfactory explanation of the phenomenon. But, in the fifth

case in Schweninger's pamphlet, there was neither vomiting nor headache, throughout the course of the disease, which commenced with coma; and the *post-mortem* appearances were those of the most common form, presenting effusion of tubercular matter at the base, softening, and effusion of serum into the ventricles: this, however, is rare.

If the child be teething, the vomiting, which is then so common, is often a very perplexing symptom, for it frequently occurs without much derangement of the bowels, and has the appearance of being spontaneous; which, together with the screaming, restlessness, and feverishness, render its occurrence calculated to excite considerable alarm. The state of the gums, however, and the effects of freely lancing them, will generally explain its nature. The influence of posture, also, in exciting the vomiting of Hydrocephalus is remarkable, and generally serves to distinguish it from that arising from every other cause. When it depends simply on gastro-enteric disturbance, the state of the abdomen, the bowels, and the tongue will usually indicate its origin.

Constipation I consider as next in importance to the symptoms we have just mentioned. Schweninger observed it in seven of his cases. In sixty cases, where the state of the bowels was mentioned, Dr. Green states, more or less obstinate constipation was present. This quite accords with my own observation. It is very important to notice,

that, if previously to the occurrence of the cerebral symptoms the child has been suffering from diarrhœa, obstinate constipation will generally supervene along with the cephalic symptoms. This, however, as far as I have observed, is not the case in the spurious forms of the disease; nor is it at all uncommon to find the bowels irregular or loose in *chronic* inflammatory affections, either of the brain or its membranes, when the central parts and the base have not been implicated. I have lately had an opportunity of examining a case of long-standing and rather extensive chronic encephalitis in a child, nine and a half years old, in whom the cerebral symptoms were very trifling and obscure, and the bowels much disordered and loose up to the moment of death, which occurred in the midst of a first attack of convulsions. The central parts of the brain were entire, and there was no effusion within the ventricles. But I do not remember ever to have met with an acute case in which there was either much effusion into the ventricles, or softening of the central parts, without a constipated state of the bowels having characterised the *early* stage of the affection. Obstinate constipation I consider a symptom of very great diagnostic value when associated with any of the more common cephalic symptoms. The loose state of the bowels, which has been said sometimes to occur in the *early* periods of the acute forms, affords an example

of the erroneous statements that have been made through confounding the symptoms of a prior disease with those referable to the brain.

Far too much stress has been laid on the *appearance of the stools* as a source of diagnosis. Dr. Fothergill,* I believe, was the first who mentioned the dark green stools, so frequently seen, as one of the characteristics of the disease. "The stools," he says, "are most commonly of a very dark greenish colour, with an oiliness or a glossy bile rather than the slime which accompanies worms." Most subsequent writers have given a similar account of the alvine evacuations. Dr. Cheyne speaks of dark green gelatinous evacuations, which he thinks consist of dark bile, mixed with the mucus of the intestines. These appearances are certainly very common, but are frequently not seen in the early stages, and sometimes not through the whole course of the disease; whilst, in various instances of gastric irritation independent of any cerebral affection, I have observed the same kind of evacuations. They must, however, from the frequency of their occurrence in Hydrocephalus, be considered as affording corroborative evidence of cerebral disease. In many cases the *fæces* are solid, tenacious, and clay coloured.

Morbid sensitiveness of the eye and ear, though in most instances very characteristic of the early stages of all forms, is of less value in a diagnostic

* Med. Obs. and Enq., vol. iv.

point of view than otherwise it would be, in consequence of being a frequent attendant of the spurious forms of Hydrocephalus. It denotes irritability of the brain and nervous system generally, which is characteristic even of those Hydrencephaloid affections that are the direct effects of exhaustion. In the various conditions coming under the head of what Dr. Nickoll has termed "erethism of the brain," an aversion to light and noise is sometimes almost as characteristic as in the more strictly inflammatory affections. These symptoms, therefore, require the concurrence of others to be made available; but their *non*-occurrence in the early stages would be pretty decisive against the existence of cerebral inflammation.

I do not hesitate to admit that from *the state of the pupils* I have rarely been able to acquire much satisfactory information, excepting where the diagnosis is sufficiently easy without reference to their condition. In the acute sthenic forms the pupils are almost invariably contracted in the onset; but, in the low or strumous varieties, there may be almost every condition of the pupil in the early periods. In children, especially, nearly any functional disturbance of the brain will give rise to variations in the state of the pupil. The headache and general disturbance from confined bowels are frequently attended by a dilated pupil, and it very often accompanies irritation from worms. In the various forms of Hydrencephaloid disease

a similar state of the pupil is common. Even in the latter stages of the most fatal forms I have seen the pupil dilated and fixed one day, and contracted, or natural, the next. Sluggishness and immobility of the pupils are, however, important symptoms; and I have already stated that the freedom with which they act when the child is roused affords us valuable aid in distinguishing the stupor that accompanies the cerebral disturbance of simple febrile affections. Inequality and irregularity in their contraction are, I think, rarely, if ever, seen, except when there is actual disease within the head. But a contracted state of the pupil must certainly be considered the more usual condition in the *early* periods.

Alterations in the colour of the iris have been mentioned as attending the early stages of the common form of Hydrocephalus; but, though I have looked for these, I have never seen them.*

Squinting, convulsive and rolling motions of the eye-balls, though very common and important signs, are all met with in temporary functional derangements of the brain, especially when connected with hepatic disturbance; but if the squinting be permanent, which it is not always, and be associated with other corroborative evidence, it may be considered as tolerably decisive of cerebral disease.

* *Vide* Martinet and Parent Duchatelet for farther information on the state of the pupil, and also an elaborate analysis in Andral's Clinique Médicale.

From the observations of Dr. Green and his fellow-labourers it appears that *the pulse* in the early stages of the more strictly strumous form is at first slow, or but little above the natural standard, and rises only in the latter stages. I have already stated that my own observation will not permit me to coincide in this statement. Though, in many instances, the statements of the French school certainly hold good, the general character of the pulse, according to my experience, is, even in the most decidedly strumous affection, *at first* quick, and more or less irregular; and I am disposed, from the observation of some cases, to think that, in those instances in which it appears to have been slow from the first, the disease has really existed some time before it has come under medical treatment, for there can be no doubt that softening of the central parts and tubercular deposition often exist, before the occurrence of either vomiting, headache, or other symptoms that attract notice.

The firmness and often the jerking of the pulse, common in the sthenic varieties, may usually be taken as evidence that the disease is of a character calling for active antiphlogistic treatment. Excitability, irregularity, and inequality of pulse are very characteristic of the low or nervous form; and when there is, at the same time, a softness and compressibility not corresponding with the degree of fever and cerebral excitement, as is

often the case, the disease may generally be considered not of a kind to be controlled by active depletion.

The condition of the pulse in the latter stages is of less importance, but there is need of great caution how we found any prognosis on either the extreme rapidity or slowness which so generally precede the fatal termination. I have known cases recover in which the pulse had been for several days too rapid to be counted.

The character of the respiration is deserving of great attention. The irregular, unequal manner in which it is performed will often serve to distinguish between cases of simple febrile excitement and those in which there is actual cerebral disease. Simple increased rapidity of breathing is more characteristic of fever. Sobbing and suspirious respiration are marked symptoms of Hydrocephaloid affections. Cruveilhier considers inequality of respiration characteristic of the meningitic form of Hydrocephalus; and thinks that, even in the earliest stage, this is a distinctive feature of the affection.

The mixture of coma and convulsions, according to Martinet and Parent Duchatelet, characterises meningitis of the base. Flinging back of the head and opisthotonos, with a rigid state of the muscles of the upper extremities, are certainly very characteristic of that form of disease; but I have seen these symptoms in a very marked degree, without

a trace of inflammation in any part of the brain, or of its membranes. Slight convulsions, with rigidity of the muscles, frequent opisthotonos and imperfect coma, are often the characteristic features of simple irritation, indicating the propriety of sedatives. Convulsions, and indeed the excito-motory phænomena in general, are the most difficult of all to interpret aright. Nor do I think that the relative order of their occurrence will often assist us so materially as some have represented. Disturbance of the mental faculties and coma usually occur at a much later period where inflammation of the base of the brain is the principal lesion, than in other forms of the disease.

A retracted state of the abdomen, that Gölis has received the credit of having first mentioned, but which is distinctly noticed by Dr. C. Smyth, I am disposed, with the former, to consider almost pathognomonic; not of all forms, but of the more ordinary scrofulous variety. Dr. Smyth says, "Their abdomen is commonly flat, and compressed in a manner I have seldom observed, except in persons affected with painters' colic;"* and I do not myself remember, in any other of the diseases of children, having seen the same condition. It is, indubitably, both by the positive and negative information it affords, a symptom that may very materially aid the diagnosis.

The state of the fontanelles deserves attention in

* Op. cit., p. 36.

all cases. When open, particularly if to any great extent, the whole pathology of cerebral disorders involving important changes in the circulation is probably more or less modified. Here, again, the negative evidence is often more decisive and valuable than the positive. A permanently elevated and pulsating condition of the fontanelles leaves no doubt of the circulation within the head being deranged, and generally indicates arterial excitement; but the condition of the face, and the action of the carotids, will often aid us in determining with what kind of vascular derangement the elevation of the fontanelles is associated.

In the simple form, which, for want of a better name, may be termed, after the example of many of the German writers, *the purely nervous variety*, where effusion into the ventricles is the only morbid appearance met with in the head after death, the characteristic features, according to my observation, are,—little headache, or screaming, or evidence of determination to the brain; a warm and dry, but not hot skin; an irregular, quick pulse; parched and cracked lips; a tongue merely coated a little at the back and in the centre; obstinate constipation and motions of a dark pitchy character, with little or no fæcal odour; frequent vomiting; *great variability* in the state of the pupils, without much aversion to light; and squinting; continued moaning, dislike to be disturbed, and considerable sensitiveness of the surface, with frequent temporary rigid

contractions of the muscles. The sopor increases gradually, and for some time the child may be roused from it; the symptoms at first being more those of irritation than oppression, but without any evidence of the nervous irritation depending on the condition of the alimentary mucous membrane, and with equally little evidence of its being attended by local arterial excitement.*

The state of simple erethism of the brain, as described by Dr. Nickoll, is distinguished from the last-mentioned form of disease chiefly by the peculiar irritability and restlessness of the child, the wakefulness, the extreme sensitiveness to light and sound, the sudden startings, and crying without any apparent cause. But in many instances it must be difficult to distinguish between these forms of disease, which are evidently closely allied in their pathology. The diagnosis must generally depend on the sagacity and discrimination of the practitioner, and on close attention to the particular features of each case. These cases, however, may usually be traced to some more or less manifest cause of irritation of the nervous system; and any doubt that may be entertained concerning their nature, may often be cleared up by a careful observation of the effects of remedies.

The affection which I have described as the simple nervous form, is probably what Dr. Nickoll has alluded to, under the strange designation of "torpid erethism."

* Vide Case i., Appendix.

The diagnosis of *Hydrocephaloid affections* resulting from exhaustion may usually be established by the discovery of some present or previous *cause of exhaustion*. So far as the nature of these cases can be determined from the actual symptoms, there seems little to be added to the admirable accounts already before the profession. The condition of the cheeks, and the temperature of the general surface, particularly of the extremities, on which so much stress has justly been laid by Dr. M. Hall, afford the most important aid in the diagnosis. "The condition of the cheeks," says Dr. Hall, "in regard to colour and warmth, may be considered as the pulse of very young infants, indicating the degree of remaining power, or of exhaustion. In the present cases, especially, there is no symptom so important, so distinctive. It is from the condition of the cheeks, in conjunction with a due consideration of the *history*, that the diagnosis of this morbid state, and the indication of the appropriate remedies, are chiefly to be deduced."* A remarkably languid expression of countenance, and a *weak* and generally *quick pulse*, are also important diagnostic symptoms.

* Lect. on the Nervous System, reprinted from the Lancet, p. 42.

CHAPTER VII.

TREATMENT.

IN proceeding to the treatment of any case of Hydrocephalus, the first question to be decided is, how far the symptoms really indicate the existence of inflammation? and the next, what is the character of the inflammatory action, and what stage the disease has already attained? In the strictly acute inflammatory forms, which occur chiefly in the more robust and healthy children, there can be no doubt that blood-letting is our sheet-anchor; and if this be early and actively employed, in conjunction with free purging, cold to the head, and counter-irritation, we may with confidence expect to overcome the disease. The treatment of acute inflammatory affections of the head is now sufficiently understood, and but little difference of opinion is entertained regarding the general plan to be pursued. The only exception is concerning the benefit to be expected from the specific action of mercury, on which point there is much conflicting evidence.

As the results of my own observation will compel me to speak in very modified terms of the utility

of active depletion in the more ordinary or strumous forms of Hydrocephalus, I shall here adduce, from my own note-book, an example of the strictly inflammatory form, in order to shew that I am fully aware of the importance and efficacy of free depletion in appropriate cases.

H. B., æt. three and a half years, a stout boy, with a large head, the son of healthy parents, having previously enjoyed good health, was brought to me, September 29th, 1840, apparently suffering from simple fever.

The following day he was found to be suffering from violent excitement of the brain. His face was deeply flushed, his head exceedingly hot; pupils not dilated, nor much contracted; skin generally hot; pulse 150, full and jerking: he was rolling his head about, screaming violently, and exhibiting great excitement. He was bled from the jugular vein to more than lb. ss., without any tendency to syncope being produced; but with the effect of diminishing the force of the pulse, which lost its jerk, but continued nearly as frequent. His head was shaved, and a cold lotion ordered to be constantly applied; and gr. j. of calomel ordered every second hour. A purgative enema was exhibited, to act at once on the bowels. These means calmed the excitement pretty completely.

October 1st.—The pulse still continued nearly 150; and the excitement, though much diminished, had returned in some measure. Four leeches were ap-

plied to the temples, the cold lotion and the calomel continued. Purgative enema repeated, and a febrifuge mixture ordered.

Evening.—Pulse still quick, and excitement not completely subdued. Three leeches to the temples again, blister to the nape of the neck. Continue the calomel.

2nd.—All the more important symptoms subdued, with the exception of the rapidity of the pulse. Sum. pulv. hydrar. c. creta gr. iij. nocte manequē.

5th.—Continued to go on well till to-day, when more heat of head was observed, and more tendency to excitement, having passed a restless night. Hirud. iij. temp. were again ordered, and strict directions given to keep the head cool. The mercury and chalk was continued, and ℥ss. ol. ricini was given.

6th.—Better. The blister, which is still open, ordered to be kept open with the savine ointment, and castor-oil given every morning, unless the bowels act well without.

8th.—He has continued to go on well. The pulse, however, is still quick. He is cheerful, and anxious for more food than would be safe. The pupils are rather dilated; perhaps not more than natural, for other children in the family have large pupils.

16th.—Running about the house, convalescent. Blister ordered to be still kept open, and the bowels carefully attended to. The child shews scarcely any

trace of having been the subject of so severe antiphlogistic treatment.

30th. — Has continued quite well since last report.

There can be no doubt that the happy termination of this case was attributable to the active depletion early employed. The tolerance of the remedies, as well as the character of the symptoms, afford sufficient evidence that the means resorted to were required; and few, I should imagine, will hesitate to admit, that, had the case been otherwise treated, it would have terminated fatally, with the symptoms characterising the latter stages of Acute Hydrocephalus. The nature of the disease in this instance was, I conceive, true inflammation of the contents of the cranium, occurring in a healthy child; and the appropriate treatment was therefore strictly and actively antiphlogistic, which, from having been promptly employed, was followed by entire success.

In proportion, then, to the acute and sthenic character of the symptoms, and the early period of the disease, in proportion to the absence of evidence of scrofulous habit or predisposition and of previous debilitating causes, should our reliance be placed on a simple, prompt, and active antiphlogistic treatment. Considerable experience has convinced me, that, in simple purely inflammatory affections of the head, in children, the principles of treatment as laid down by the best writers, and as generally

practised in this country, are worthy of the fullest confidence.

It is impossible to read the sixth chapter of Dr. John Clarke's Commentaries without admiring the masterly hand with which he has depicted the inflammatory form of Hydrocephalus, and the excellency of the practical rules he lays down for its treatment. Much of the difference of opinion that has prevailed concerning the treatment of this disease has arisen from not distinguishing between the different forms. In the cases now alluded to, and which belong to the third variety I have described, Dr. Clarke's plan of treatment will be found fully to justify the confidence with which he speaks of it; but if this be adopted in other forms, as some would have us to believe that it may, our expectations (to speak in the mildest form) will be grievously disappointed.

In the consecutive variety, or that succeeding to scarlatina and other exanthemata, the treatment should also be antiphlogistic. Whether in all cases there be actual inflammation within the head, or not, experience has amply proved that nothing but free depletion will save the patient, if the head symptoms be at all severe; but in this form it is absolutely requisite to bear in mind the general pathological state of the system, and particularly the condition of the renal and cutaneous functions. Having employed general depletion, or cupping, to the back of the head, or leeches to the temples,

according to the age of the patient, or the circumstances of the case, much advantage will often be derived from cupping or leeching the loins, and the subsequent use of the warm bath. The skin should, by every possible means, be kept warm; and whilst, therefore, we are assiduously applying cold to the head, the child should be wrapped in flannel, and the surface of the skin rubbed gently with the hand covered with flannel, or with the flesh-brush, and the feet frequently immersed in hot water. Free catharsis should be established by means of a full dose of calomel, and subsequently by repeated doses of the compound jalap-powder, which will be found one of the most useful purgatives in these cases. On these means our chief reliance must be placed; but I usually give small doses of tartar-emetic with the liquor ammoniæ acetatis at intervals of two or three hours with the view of acting on the skin. The first object, however, should be to relieve the head symptoms, by depletion and purging; and our efforts may then be directed to obviate their return, by removing those conditions of the system on which the cerebral disease essentially depends.

There is still great reluctance manifested by many practitioners to have recourse to depletion in these cases; but I am satisfied, from my own observation, that they are to be successfully treated, only on the above principles. That considerable modifications are required in different cases, may

be admitted; but it is needless to enter on the consideration of these details, which must be left to the discrimination and judgment of the practitioner.

The therapeutic principles in relation to the low or strumous form of Hydrocephalus, it is much more difficult to define, and respecting them far greater diversity of opinion exists. Although, for some time past, antiphlogistic doctrines have (almost exclusively of all others) prevailed in this country, and though the inflammatory nature of the disease has been very generally and unhesitatingly assumed, there is little in the practical results of these doctrines to render any one, that has seen much of the disease, strongly wedded to them. To all objections to blood-letting and other antiphlogistic measures, deduced from the very general want of success that has attended such treatment, it is naturally and justly replied, that in comparatively few instances does the disease fall under our notice, till the time has elapsed when any benefit can be expected from antiphlogistic measures. If early adopted, it is maintained that a degree of success equivalent to that which attends the antiphlogistic treatment of any other inflammatory disease will be found to result from the employment of blood-letting in the common forms of Hydrocephalus.

But, although I have employed depletion in all stages of the complaint, I have not met with that success which would at all justify me in assenting

to any such statement. Topical depletion, indeed, I have found of great use in relieving particular symptoms, or in aiding other remedies. From some points of analogy between the more strictly inflammatory forms and those which we have designated the low or nervous form, and from deference to the generally received doctrines, my chief dependence was, for a long time, placed on blood-letting; but the continued melancholy results of my efforts compelled me materially to modify my treatment: and, the more I reflect on the pathology of the disease, the less disposed am I to make blood-letting the basis of the treatment. I am also inclined to believe that the experience of the profession is really more in accordance with my own than might be imagined from the therapeutic principles publicly taught. I would not, however, be supposed to condemn blood-letting in the *early* stages; for I still think that it will often be of essential service; will place the brain in a more favourable condition for being acted on by other measures, and will often relieve the headache and moderate the symptomatic fever, as well as the inflammation when present; but if it is expected by this measure to cure the disease, as in cases of simple inflammatory action within the head, I am convinced that disappointment will too frequently follow its employment. Dr. Abercrombie, whose therapeutic rules with reference to cerebral disorders in general are beyond all praise, seems to

have been fully aware of the material difference of the relation in which the ordinary forms of Hydrocephalus stand to blood-letting, as compared with other inflammatory affections of the head. "In those cases" (of inflammatory affections of the brain, he says) "which assume the more acute or active forms, general blood-letting must be used in the most decided manner; while in the cases which assume a more chronic character, as many of the common cases of Hydrocephalus, it has less control over the disease, and is not borne to the same extent." Much false reasoning has been resorted to on the employment of blood-letting in the common forms of Hydrocephalus from the success that has followed its use where nothing but irritation of the brain, and consequent congestion, had existed. The cases of cerebral determination and congestion, induced chiefly by irritation of the brain, are far more numerous in practice than any form of inflammation, or Hydrocephalus; and, as it is often difficult to discriminate between such cases and true Hydrocephalus when they have been relieved by blood-letting, it has often been imagined that Hydrocephalus has been cut short in the early stage.

We are told, however, that Dr. Maxwell of Dumfries has cured sixty out of ninety cases of Hydrocephalus by bleeding carried to such an extent, that it is to be hoped few will be disposed to imitate his example; for the children, it is said, were placed

in the horizontal posture, and the jugular vein opened, and closed with the finger from time to time, so as to prevent the occurrence of complete syncope, and the bleeding thus continued till the pulse was imperceptible. Continued insensibility, that lasted for some hours, followed the shock thus given to the system. If the sixty out of the ninety cases reported to be thus cured were all cases of acute sthenic inflammation of the brain and its membranes, there may perhaps be less surprise felt at the success; though, even on this supposition, it is a startling statement, knowing, as we do, how often convulsions, fatal exhaustion, and an uncontrollable disposition to effusion, ensue on the abstraction of so large quantities of blood from children: but to assume that sixty out of ninety cases were instances of acute sthenic cerebral inflammation, is certainly to assume a proportion that is totally opposed to my observation, and, I believe, to that of most practitioners.

It has been doubted, on theoretical grounds, whether, admitting the existence of acute inflammation, it can be treated with equal benefit by blood-letting, when seated within the cranium, as when occupying other parts of the body: but however much the peculiarities of the cerebral circulation may render it necessary to modify the application of some of our most important remedial agents in many of the diseased states of the brain, and however much the true nature of many of them

may be thus obscured, such peculiarities have nevertheless been found by experience not to militate against the utility of blood-letting, when acute inflammation of the brain in a healthy subject is really present. The efficacy of depletion in such cases, is as decided as in any inflammatory affection whatever. But it cannot be too strongly impressed on the mind, that peculiarities in the cerebral circulation give rise to symptoms of functional derangement which cannot be removed, as in other circumstances they might, by blood-letting, but which may by that measure often be aggravated.

That many of the more important symptoms in the latter stages of the low form of Hydrocephalus are of the character just referred to, cannot be doubted. The inflammatory action also, when present, is, in the majority of these cases, of a character over which depletion has comparatively little influence. The previous state of health, and the manifest strumous diathesis, must modify materially the action of depletory measures; and there can be little doubt that the peculiar disorganization constituting the white softening, and the tendency to serous effusion, will often be favoured by having recourse to anything like active depletion.

But, apart from all theoretical considerations, we may affirm, that experience teaches us, that, in proportion to the evidence of the existence, or the probable existence, of scrofulous action, full and active depletion will fail to subdue Hydrocephalus,

though actual inflammation of the base, or other parts of the brain, may be present; and that the fatal termination is, in many cases, manifestly less to be attributed to the amount of inflammation present, than to the functional derangement, which there is reason to believe may often be increased by active depletion. Does any one attempt to subdue those forms of sub-acute peritoneal inflammation occurring in scrofulous subjects, and attended by the deposition of tubercular matter, in the same manner as he would ordinary cases of healthy acute inflammation of the peritoneum? Undoubtedly not. The symptoms attending the same form of inflammatory action within the head, in the cases in question, it is true, are *apparently* more acute, and the immediate danger to life is far greater; but this arises from the difference in function of the parts respectively implicated in the inflammatory action. Many of the symptoms of Hydrocephalus, and much of the danger, (in some instances, it might be said, all,) depend on the continued irritation of the nervous system, and the exhaustion which at length ensues.

In the low or nervous form of Hydrocephalus, generally speaking, all the advantage that can be expected from depletion is to be obtained by the application of leeches behind the ears, or to the temples, and by cupping at the back of the neck. There is often more advantage obtained from the abstraction of a few ounces of blood from the vicinity of the mastoid process, than from any other locality;

a circumstance explicable by reference to the free communication existing there between the external vessels and those of the interior of the cranium. A single incision by the scalpel of about half an inch in length, and of tolerable depth, and the subsequent application of a cupping-glass, are often a more effectual and more convenient mode of abstracting blood from this part, than by means of leeches; and a considerable quantity of blood may thus be obtained. The German practice of applying leeches to the nares is also one worthy of imitation.

It is in the early stages that these means will be of most benefit; and then in proportion to the degree of febrile excitement, of headache, and of existing congestion, or previous inflammation. In the second period of the disease, even these measures must be employed with great caution and discrimination; and in all stages of those forms presenting the most decided evidence of strumous action, and where the febrile symptoms are comparatively trifling, even topical depletion may be productive of injury, unless very sparingly employed.

I am quite aware that in the eyes of many practitioners of the present day, these very modified views respecting the employment and utility of bleeding will meet with but little favour. They have, however, been forced on me by my own observation and experience of the disease; and their soundness has, I think, been proved by the increased success that has attended their adoption. Let it not be

forgotten, however, that our success will be proportioned to the judicious manner in which we combine other parts of the treatment with this modified employment of depletion. It appears to be an error, into which many have fallen, to suppose that if the treatment is to be antiphlogistic, and depletion resorted to at all, diuretics, sedatives, or any other remedies adapted to counteract the tendency to effusion, or other changes unconnected with inflammation, may be dispensed with. But it is far otherwise. The true secret of success consists, not merely in preventing or counteracting the attendant, and often accidental, inflammatory action, but also in allaying irritation of the nervous system, and in obviating the tendency to effusion and to exhaustion.

Cold.—There are few cases, perhaps, in which the application of cold to the head, in some form or other, and to a certain extent, may not be useful; but the more powerful of the methods of applying it are admissible only where there is considerable heat of head and of surface, and a tolerably firm pulse. The sedative influence of the cold douche (so valuable in the strictly inflammatory forms) is by no means devoid of danger in some stages of the variety under consideration. A prolonged application even of cold evaporating lotions may so depress the system as to reduce the temperature of the whole surface, as well as of the head, and increase the coma. In the early stages, however, cold applications to the head, with a due attention

to the state of the pulse, and of the cutaneous surface, will generally be productive of good; more particularly if the extremities be at the same time kept warm, for which purpose a hot pediluvium will usually be desirable. When the skin generally is moist, or when the head is covered with perspiration, as in the latter stages it often is, and when the coma is considerable, and the pulse feeble, the use of cold in any shape is quite inadmissible. I usually prefer having the hair cut quite short, to shaving of the head; for evaporation from the short hairs goes on more freely than from the bare scalp. The head should be raised, and, where practicable, placed on a hair cushion covered with oiled silk; the various reasons for which are obvious.

To the temporary application of cold we may often have recourse with advantage, for the sake of calming any exacerbation of headache, or excitement, when its continued employment would be very undesirable.

If the application of cold, in the most effective form, that of the cold douche, be had recourse to, it should be superintended by the medical attendant, and not left to nurses, or it will not be properly employed; and, generally speaking, the use of cold in any shape will require the careful attention and supervision of the practitioner.

Purgatives.—Experience has amply corroborated the theoretical indications for the employment of purgatives in almost every form of Hydrocephalus.

In the early periods they should be employed so as to procure free evacuations as speedily as possible: for this purpose a full dose of calomel should be given, and a purgative enema ordered, and repeated two or three times. These means will generally succeed better than any others; for the irritability of stomach is often such as will seriously interfere with the action of other purgatives. If the first dose of calomel be rejected, it should be repeated two or three times before having recourse to other medicines; but, if it still be rejected, half a drop or a drop of croton-oil, rubbed up with a little sugar, may be placed on the tongue. The exhibition of a purgative enema at the same time is important. But, should the irritability of stomach still prevent the purgative from being retained, advantage may be gained from the application of a sinapism to the epigastrium, and the exhibition of a few doses of magnesia given with the ordinary saline draft in a state of effervescence. The object for giving purgatives should be, in the first place, to clear the bowels and act on the secretions, particularly of the liver; and, in the second place, to keep up counter-irritation. The derivative effect of active purging, on the brain, is probably one of the most important means we possess of overcoming the disease, and, to facilitate the action of purgatives, will sometimes be a sufficient reason for the employment of depletion when there is much dif-

difficulty in overcoming the torpor of the intestinal canal, or the excessive irritability of stomach.

Having once obtained the free action of purgatives, the alimentary canal should be kept stimulated by them through the whole course of the disease. "More recoveries," says Dr. Abercrombie, "take place from head affections of the most alarming aspect, under the use of very strong purging, than under any other mode of treatment." Dr. Cheyne speaks in an almost equally decided manner on the utility of purging; and Whytt and Rush both considered it a most important part of the treatment. We need scarcely remark, that, where there is decided evidence of gastro-enteric inflammation, acrid purgatives would be highly improper; and, if the cephalic symptoms have come on in the course of enteric disease, purgatives must be very cautiously and sparingly used.

From *counter-irritation* by means of blisters benefit may generally be derived, and, conjoined with purgatives, in some forms and periods of the disease they are most efficient and valuable remedies. In the early stages of cases attended by much febrile excitement, or heat of head, they should be deferred till topical depletion, cold, and purgatives have been had recourse to; and, in the more strictly inflammatory forms, much harm may be done by blisters early employed: but in other cases they may be used, from the onset, and with marked advantage. It is, I think, exceedingly undesirable,

on many accounts, to apply blisters to the scalp, unless it be in the very last stage, and when the coma is complete. The best localities for their application are the nape of the neck, the inside of the thighs, and the calves of the legs. In some cases they may be applied with advantage to the epigastrium, or hypochondria; and sinapisms to the calves and the soles of the feet, more particularly in the latter stage, are *juvantia* which ought not to be neglected.

When the cephalic symptoms have succeeded to the suppression, or sudden disappearance, of cutaneous eruptions, there is a special reason for having early recourse to counter-irritation.

Narcotics and sedatives.—Opium, in all affections of the brain, is a remedy of which it may emphatically be said, that it is powerful for good or for evil. This is especially true in the cerebral disorders of children. There is hardly any remedy of which the tolerance of its action is a better test that it is required and will prove useful. But there are few remedial agents of whose probable action and utility, in diseases of the nervous system, it is often more difficult to judge. This, in addition to certain theoretical notions and prejudices, that have long prevailed, regarding the *modus operandi* of opium, has greatly limited the beneficial effects which it is capable of producing. These prejudices, however, which had acquired increased force, from fashion, are, in

some measure, subsiding ; “yet even now it may be affirmed that there exists a distrust, both as to the frequency and extent of its use, not warranted by facts, and injurious in various ways to our success in the treatment of disease. This is the more singular, seeing the boldness of our practice in other points ; that we have, in the sleep produced, a sort of limit and safeguard to its effects ; and that we possess remedies of easy application for all injurious symptoms that can arise.” * How much the influence of opium on other functions of the body depends on the particular state of the nervous system, daily experience teaches, as well as the very great diversity of its action on the brain. In what many of these states of the nervous system consist, we are frequently quite ignorant : but we know, for example, that almost any condition of the body attended by great suffering, is accompanied by such a state of the nervous system as renders it more or less insusceptible of many of the more important effects of opium ; and whether in all these states the disease, or cause inducing the pain, may be aggravated or remedied by the use of opium, its narcotic powers are found to be greatly diminished, and others of its ordinary properties appear lost.

* *Vide* Med. Notes and Reflect., by Dr. Holland, “on the use of Opiates ;” a work in which there are more philosophical remarks on important points of medical practice than in almost any other that has appeared for many years.

It seems, however, to be tolerably well established, that in children there is a peculiar susceptibility to the action of opium, as we occasionally notice in adults from idiosyncrasy of constitution: but it does not, therefore, follow that in the *diseases* of children this susceptibility still exists, for we cannot always argue analogically with regard to the action of any remedy in disease, from its physiological action in a state of health; and this is especially true of opium.

The power possessed by opium of allaying excessive vascular action, though well established, is hardly admitted, or made available, in practice so generally as it deserves. It is on this, undoubtedly, that its sudorific action depends; and it is in consequence of the increasing evidence of this power that it is now coming into more general use in inflammatory diseases.

But, perhaps, the most signal examples that could be adduced of the value of opium are those cases of inflammation in which its influence on the vascular and nervous system are equally required; where the danger to be obviated arises, not merely from the inordinate vascular action in the parts inflamed, but also from the peculiar condition of the nervous system, which, if not relieved, rapidly induces fatal exhaustion.

Peculiar difficulties, however, attend the employment of opium, or any other narcotic, in inflammatory affections of the head; for we are, in most

of these cases, compelled to be guided, rather by subjective, than objective symptoms. Any remedy, therefore, which masks the chief indications by which the disease is manifested, must be employed with great discrimination and caution. The judicious practitioner will frequently be constrained to forego the employment of a remedy that might be useful, from the increased risk that would attend the concealment of present or future danger.

It is this consideration, probably, more than any other, that has so much restricted the employment of opium in Hydrocephalus; for, if cautiously given, even in children, there would frequently be no hesitation in making trial of it, could we be sure of being apprized of the real influence it was exerting over the disease. The difficulties and obscurities that attend the study of all points connected with the pathology of the nervous system, have also prevented our making that use, which in other circumstances we can, of the results of experience.

We have, however, sufficient evidence of the value of opiates in some forms, and in certain stages of Hydrocephalic affections, to warrant our considering them as most valuable agents, and to call for increased attention to the whole subject of their employment.

There is one point that seems to require special investigation. It has been generally supposed that much of the danger attending the use of opium depends on the cerebral congestion to which it gives rise. Now, it is very questionable whether the

symptoms usually believed to indicate congestion, are not really referable to a very different state; one probably, nearly allied to paralysis, — a state of torpor of the nervous matter. If this be so, it would perhaps explain, in some measure, the great susceptibility of children to the action of opium; and, whilst it would fully justify extreme caution in its employment in any case, would prove that the dread entertained regarding its use in particular states was not well founded.

Opium, either alone, or in combination with various other remedies, has been frequently employed in Hydrocephalic affections with varied success. Dr. Percival advises the use of opiates in large and repeated doses, (unless there be coma,) with a view to relieve the pain and spasms, when these are violent.* He usually gave it, in conjunction with calomel. Dr. Temple recommends the same combination, which, in one instance, he gave with marked success.† Dr. Rush, whose treatment was of the most active antiphlogistic character, and various other writers, have adduced good evidence in favour of the use of opium; but I shall here merely request attention to a very interesting and important case, recorded by Dr. Bright, illustrative of this subject. It is that of a child eighteen months old, who, in the course of teething, became the subject of Hydrocephalic symptoms, which, from their decisive character, were treated in the ordinary antiphlogistic manner. But,

* Vide Medical Facts, &c., vol. i.

† Practice of Physic.

under this treatment, the case assumed a more and more unfavourable character. The child moaned and screamed incessantly, the pupils were becoming dilated, he had suffered severe convulsions, the most rigid permanent contraction of the hands and feet had continued for twenty-four hours. It was considered that the case could not by any treatment be rendered more hopeless; and it was determined, therefore, to give laudanum. For three days one drop was taken every four hours; after which it was increased to two drops, which were repeated every four hours for four days more, when the periods were lengthened to six hours; and, two days after, it was given at night only. Under this treatment the symptoms abated from day to day; and the effects produced by the laudanum were taken as a guide for its continuance, and for the quantity to be given. Purgatives, digitalis, calomel, and blistering were at the same time employed; and therefore, says Dr. Bright, "I should be sorry to ascribe more than the due share of the recovery to the laudanum. But it was impossible not to perceive that the malady first assumed a more favourable aspect shortly after the opiate plan was brought into effect, and the cure was completed under the same plan of treatment." Notwithstanding the caution with which Dr. Bright speaks, we need not hesitate in referring the cure in this case to the happy effects of the laudanum.

In the earliest periods of the more inflammatory

cases, it is still doubtful whether we should ever be justified in having recourse to opium; but when, after the employment of general or local depletion, cold, purgatives, and blisters, great irritation of the nervous system still exists, as indicated by frequent vomiting, twitchings, partial convulsions, or permanent contractions of the muscles, opium will often be found of signal service. There is nothing that wears out the vital powers sooner than the continuance of such irritation, which it is therefore a most important indication to calm as speedily as possible. We must, however, judge for ourselves, in each individual case, how far sedatives are acting well, or not, towards the attainment of this object. It is impossible to lay down specific rules for the exhibition of opium in these cases; but, from some facts that have fallen under my own notice, I am disposed to think with Dr. Holland that the state of the pupil may prove a good test for its exhibition, a contracted state contra-indicating its employment. In inflammatory affections of other parts, particularly of the peritoneum, a moist tongue and perspirable skin generally indicate that opium is admissible; but in the cerebral affections of children it by no means follows, that because the skin is dry, and the tongue and lips parched, opium is contra-indicated. I have seen, in such circumstances, the happiest results from the employment of Dover's powder.

The more reason we have for considering the

symptoms to be dependent on irritation alone, the earlier and the more unhesitatingly may we have recourse to sedatives; and in the latter stages, when it is manifest that depletory measures are no longer admissible, but when the pulse is still rapid, and muscular twitchings and spasms are frequent, though the child may be passing into a more decidedly comatose state, some prospect of success is still afforded by the careful exhibition of opiates, and the threatening or existing coma is by no means always sufficient to contra-indicate their employment.

On the subsidence of the severer symptoms of excitement, after the use of antiphlogistic measures, watchfulness, sleeplessness, and great susceptibility to the slightest impressions, often remain, and are exceedingly unfavourable to the continuance of the improvement already effected, as well as to the restoration both of the vascular system and the brain itself to a healthy state. Sedatives judiciously given at such times may frequently (as in more decidedly inflammatory affections of other parts) be the means of ensuring the permanency of the good already effected.

Opiates, in combination with calomel or hydr. c. cretâ, may often be advantageously given, simply to relieve the sickness, or pain of the head, or great irritability of the bowels.

When cerebral symptoms of a Hydrocephalic character are the result of some manifest cause of

irritation in other parts than the brain, the employment of sedatives is often attended by the happiest results. In those forms of spurious Hydrocephalus which come under the head of Erethism of the brain, after due attention to the state of the gums, the bowels, and the liver, the accession of inflammation and the occurrence of effusion may frequently be prevented by the cautious use of opiates. Seclusion from light and noise, and every external source of irritation and excitement, constitutes an important part of the treatment of such cases.

Where our object is simply to allay irritation and procure sleep, the muriate of morphia appears to me the best preparation of opium, not merely in the diseases in question, but in infantile disorders in general. But where the object is also to support the strength, and where consequently the tonic properties of opium are required, (often its most important virtues,) Dover's powder or laudanum are the best forms for children. Hyoscyamus is almost the only other sedative of which I am qualified to speak; and this, though often useful, is in general much inferior to opium.*

* It may not, perhaps, be unnecessary to caution those who are unaccustomed to give opiates to children, against beginning with too large a dose. To a child of one year old it is not safe to give more than one drop of laudanum for a first dose; nor more than half a drop to an infant under six months. If, after the lapse of three or four hours, no unpleasant symptoms occur, the dose may safely be increased.

Digitalis, that has been highly extolled by some, and the evidence in favour of which is considerable, I have never ventured to prescribe. On the admission of its advocates, it is to be depended on, only when given in full doses; and it is then of so uncertain operation, and the consequences are of so dangerous a character when an overdose has been taken, that, independently of the obscurity it throws on many of the more important symptoms, I have never been able to overcome my objections to its employment.

Mercury. — Various are the motives for which mercury has been employed in the treatment of Hydrocephalus. By many it is believed to exert a direct antiphlogistic influence, and to control those actions in which inflammation essentially consists; some give it, to act on the secretions; some, merely as a purgative; and others, to promote the absorption of the fluid still too frequently imagined to constitute the essence of the disease.

Notwithstanding the firm belief that many entertain of the specific action of mercury in acute inflammations, and the amount of evidence on which that belief is founded, it is a question still open to discussion and fresh investigation. Concerning its action and utility in Acute Hydrocephalus, the most conflicting evidence exists: "In the first or active stage," says Dr. Abercrombie, "the indiscriminate employment (of mercury) must be injurious;" and in another place he observes, "I

confess the result of my own observation is, that, when mercury is useful in affections of the brain, it is chiefly as a purgative." In these views Dr. Alison and many other high authorities are well known to concur. But weighty and varied testimony in favour of calomel might be adduced from numerous authors, who have written especially on this subject, from Dr. Dobson down to the present day.

The general questions of the *modus operandi* and value of mercury in acute inflammations I shall not attempt to discuss. Whatever advantage may be gained from the specific agency of this powerful medicine in the treatment of acute inflammation of serous membranes in general, my own experience compels me to say, that in the ordinary forms of Hydrocephalus I have seen little or no evidence that the encomiums which have been passed on it are deserved. In the latter stages, it has certainly appeared sometimes to be useful. It is, undoubtedly, a valuable addition to opiates, obviating the injurious influence that they may have on the secretion of the liver and the action of the bowels; but, even when thus given, it is exceedingly difficult, in children, to obtain the usual evidence of its action on the system. This is admitted by most writers; and Dr. John Clarke, who employed mercury largely in a variety of diseases, states that he never met with more than three instances in which it induced salivation in children under three

years of age. Some, however, who think it desirable to procure the specific action of calomel on the gums, object to its combination with opium to prevent its passing off by the bowels, evidently placing more reliance on its purgative action. Dr. Watson, for example, though dissenting from Dr. Abercrombie's opinion, and recommending the exhibition of three or four grains of calomel every three or four hours, says, that it should not be given, with the direct object of affecting the gums, but as part of a purgative plan, and that we must take the chance of its specific effects.*

The utility of calomel as a purgative cannot be questioned, and there are few cases of Hydrocephalus in which it may not be advantageously given for the sake of its action on the bowels, as well as on the liver and other secretory organs. For these purposes I employ it, even in cases where (excepting from deference to authority) I should not have recourse to mercury in any form.

In many instances where calomel has been given in combination with opium, for the sake of securing its specific action, I have no doubt that the benefit obtained ought to have been attributed to the opium rather than to the mercury. As an adjunct to squills and other diuretics, calomel is frequently of great service; particularly in the more protracted forms, and in the latter stages of the disease.

Diuretics, notwithstanding the neglect or con-

* *Vide* Lectures in Med. Gazette, 1841.

tempt with which they have been treated, since inflammatory doctrines have become so prevalent, are capable of effecting great good in many cases of Hydrocephalus. In the latter stages of the more sub-acute and low forms, particularly when the secretion of urine is much diminished, squills, I am satisfied, are often useful. The tincture combined with sp. æther. nitrici in camphor julep, is a good form for its exhibition when the irritability of stomach is not excessive. In other cases, the powder of the root with calomel, opium, and aromatic confection will answer better.

There is a mode of giving squills and mercury, first, I believe, recommended by Dr. C. Smyth, and recently again brought into notice, which appears worthy of attention. Several remarkable instances have been adduced of the powerful diuretic action and the happy effects that have followed the employment of this particular compound, which is thus described by Dr. C. Smyth: "Ten grains of crude quicksilver was rubbed down with twenty or thirty grains of cordial confection, or manna, to which was afterwards added gr. v. of the fresh squill, and the whole made up with any syrup into the consistence of a soft bolus or electuary, to be divided into such small parts or portions as was necessary for its being administered along with a little gruel, panada, or the like; and, when it could not be conveniently administered in a solid form, I have given it as a mixture, suspending the mercury by means of some mucilage: but I pre-

fer giving it in the first form where it can be done. The dose above mentioned, that is, ten grains of mercury with five grains of the fresh squill, was given every six or eight hours where the child's stomach could bear it. The efficacy of this medicine I have occasionally endeavoured to promote by giving other diuretics at the same time, but the stomach will seldom admit of this practice." *

Dr. Watson speaks favourably of this mode of giving squills; and I have employed it in some cases of general dropsy, with good effects. From the experience I have had of the beneficial action of squills in other forms, I am disposed to augur favourably of this peculiar compound in many varieties of Hydrocephalus.

There is good reason to believe that, sometimes, though by no means so frequently as has been thought, death results solely from effusion into the ventricles of the brain; and the removal of this fluid must therefore, in certain cases, be an object of great importance. That diuretic remedies will facilitate its removal, is at least highly probable; and there is evidence of free diuresis having contributed materially to the cure of many cases.

From *iodine and its compounds* decided advantage has been obtained in several instances that have fallen under my own observation. In Schmidt's *Jahrbücher* for January 1840, there appeared the following formula, which is reported to have been given

* Treatise, &c., p. 73.

with marked success in many cases of Hydrocephalus at Riga: $\mathcal{R}$ calomel. gr. viij. iodinii gr. j. sacchari albi gr. lxxx. M. f. pulv. et divide in partes xvj. æquales. If the calomel be first rubbed with the iodine, and the sugar then added, the powder becomes red; but if the calomel be first mixed with the sugar, and then the iodine added, the colour is greenish. In the first instance, the deuto-ioduret of mercury is formed; and, in the second, the proto-ioduret. The red powder appears to have effected the greater number of cures. Each dose of the powder, after the above manipulation, is supposed to contain about $\frac{1}{16}$ of a grain of corrosive sublimate, $\frac{2}{5}$ of a grain of calomel, and $\frac{1}{9}$ of red ioduret of mercury. This preparation I have had recourse to in several cases, the results of which have been favourable, and encouraged the hope, that, in the more decidedly strumous forms, much benefit may be derived from it.*

The manifest utility of the hydriodate of potash, in certain forms of dropsical effusion, occurring in scrofulous habits, has naturally led to its employment in some varieties of Hydrocephalus. There is no remedy that often acts more decidedly on the kidneys.

It has been recommended by Dr. Roeser, in large doses in cases, where the ordinary remedies have failed, where paralysis has already occurred, and where death seems impending. His formula is,

* Vide Cases i. ii. and iv. Appendix.

Hydriod. potassæ ʒj. aquæ ʒss. Sumat gut. xxx. ex aquâ omni horâ. This he continued for a week, and then gave half the quantity for four days more. In one case, when the use of the medicine was commenced, the child had been affected for six days with symptoms of Hydrocephalus, for which leeches and cold had been applied to the head, and calomel given in large and repeated doses without any amendment. On the 12th of February 1840, the child lay insensible, with dilated and fixed pupils, complete paralysis of the right side, and frequent automatic movements of the left leg and arm. The face was flushed, the body bathed with perspiration, the pulse frequent, and deglutition difficult. The hydriod. potassæ was now given in the manner just mentioned, and within twenty-four hours a drachm had been taken without any perceptible change. On the 14th, the pupils, before much dilated, had become contracted; and, on the 15th, the plaintive Hydrocephalic cry less frequent, the pupils neither dilated nor contracted, and the bowels acted freely. On the 21st, the child gave evident signs of consciousness, the pupils acted regularly, and the face had a cheerful air. The paralysis lasted till the 23d. In May, the child was cheerful and intelligent.*

In the Medical Gazette for September 30, 1842, Mr. Fluder of Lymington has related three cases of Acute Hydrocephalus successfully treated by hydriodate of potash, given in doses of half a grain every

* Hufeland's Journal, April, 1840.

two hours. The cases were in the last, and apparently fatal stage of well-marked Hydrocephalus ; convulsions, coma, dilated pupils, &c., having existed for some time. The only visible effects of the medicine were diuresis and salivation. The children were about one year old, and calomel had been previously given.

Drs. Maunsell and Evanson, among other authorities that might be adduced, speak favourably of iodine and the hydriodate of potash. They are certainly remedies worthy of more extended trial than has yet been given them. It is probably in the more decidedly scrofulous forms that they will be found most useful, and especially in those cases that run rather a sub-acute or chronic course.

The warm bath may often be employed with great advantage, whether for the sake of equalizing the temperature of the skin, or allaying irritation, and procuring sleep ; and, when used simultaneously with the application of cold to the head, the efficacy of the latter remedy may thus be sometimes much increased. In that state which has been spoken of as Erethism of the brain, the frequent use of the warm bath constitutes an important part of the treatment. In cases where the extremities are apt to be cold, the feet should, from time to time, be placed in hot water, to which a little mustard has been added, and subsequently well rubbed and wrapped in flannel.

Stimulants and *tonics*, though requiring the utmost caution and discrimination in their use, are in some forms, and in certain stages of the complaint,

imperatively demanded. Camphor mixture and ammonia, with or without laudanum, will often be found decidedly useful. Dr. C. Smyth thinks the aromatic confection, ammonia, and a little generous wine, among the best cordials, and he occasionally gave the *vinum ferri*, or the carbonate of iron. The *vinum ferri* I am disposed to think of more value than quinine, which many of the German physicians have recourse to. Dr. Copland very justly remarks, "that practitioners in this country have too often been deterred from the use of tonics and restoratives in the advanced periods, particularly of the nervous form of the disease;" and my own conviction is, that they are more frequently called for than is generally supposed. Too exclusive inflammatory doctrines have naturally led to the rejection of stimulants and tonics; though, even when the nature of the disease is inflammatory, stimuli are not infrequently the most important remedies.

The diet in the early periods of all cases should be strictly antiphlogistic; but there is danger in continuing this too long, and the time at which it should be abandoned for more nourishing food varies greatly in different instances. In the latter stages, particularly of protracted cases, proper nourishment is absolutely necessary to support the strength; indeed, it often constitutes the most important part of the treatment: the child may be exhausted and worn out solely for want of due nourishment, whilst the irritation of the brain and the tendency to effusion may, from the same error,

be kept up and augmented. It is often, however, very difficult to make the children take nourishment. The irritability of stomach, the aversion to food, and the dislike of being disturbed, are serious obstacles not easy to overcome. Great responsibility in this respect rests on the nurse; and we are often most provokingly frustrated in our efforts by the want of attention and assiduity, or the foolish objections and false kindness of the attendants.

If the child be still at the breast, the mother's milk, or asses' milk, are generally the best kinds of food; though a little melted jelly, or chicken-broth, is often desirable. For older children chicken-broth, or beef-tea, with vermicelli, or arrow-root and milk, will be found suitable. A decoction of pearl-barley, boiled so as to form a stiff jelly when cool, strained and mixed with equal parts of beef-tea or mutton-broth, is a good form of giving nourishment, and one which children will generally take well.

The effects of nourishment or stimuli on the pulse and on the temperature of the skin, particularly of the head, should be carefully noticed, as it is chiefly by these effects that we are to judge of the propriety of the course we are pursuing. But the sedative effect of nourishment, as evidenced by its diminishing the restlessness and procuring sleep, is often decided.

It scarcely needs be mentioned, that in the spurious forms of Hydrocephalus, manifestly depending

on exhaustion, the exhibition of stimuli and nourishment constitutes the main feature of the treatment; nor is careful maintenance of the recumbent posture of less importance.

During *convalescence* the state of the bowels and of the secretions, the diet, and the maintenance of the most perfect quietude, are objects requiring constant and careful attention. The bowels, when the cerebral disease has been overcome, though generally regulated without much difficulty, require great attention; particularly when, as is often the case, the appetite becomes voracious and difficult to control. A liberal supply of proper nourishment will generally be requisite; but this should neither be of too stimulating a kind, nor so bulky as to load the stomach and bowels. Everything calculated to excite the brain should be carefully avoided. Whilst, therefore, the apartment is kept at a moderate temperature, and well ventilated, much light should be excluded; and the older children should be vigilantly watched, lest they be over-excited by playthings, companions, or books.

Some gentle tonic may generally be given with advantage; but the choice must depend on the constitution of the child and the precise character of the previous disease, as well as on the actual state of the more important functions. I have found the infusion of gentian with small doses of hydriodate of potash, and a little syrup of orange-peel, of decided advantage.

In other cases the milder preparations of iron are preferable, and sometimes the infusion of cinchona. It is frequently desirable to keep up the action of the kidneys, for some time, by means of diuretics; and for this purpose, unless the hydriodate of potash have been prescribed, the spirit of nitrous æther, or tincture of squills, will be found to answer the purpose.

Change of air, to a warm dry locality, or to the seaside, according to circumstances, should be had recourse to, as soon as possible after the establishment of convalescence.

Preventive treatment.—The conclusions to which we have come concerning the real nature of Acute Hydrocephalus, that in a very large majority of instances it is a disease arising from scrofulous action, involving important alterations in the nutrition of the brain as well as of other parts, will explain more satisfactorily than any other view of its pathology, many of the most important points connected with its history.

We are thus enabled to understand why it should be so frequently hereditary; why it should prevail more in certain districts and localities than in others; why it should be more frequent in particular states of system than in others; why it should so often succeed to such diseases as hooping-cough, and measles, and small-pox; and, finally, why it should hitherto, in the large majority of cases, have baffled all treatment. Nor can I abstain from ex-

pressing a strong conviction and earnest hope, that the mortality attending it (though this must ever be very great) will be much diminished when our remedial efforts are made with due consideration of its true pathology. But, above all, the results to which we have come are calculated to indicate more clearly the path we should pursue, in order to ward off the disease. Our prophylactic treatment at least may be materially modified, and attended with more success. Our aim must be, not merely to counteract the tendency to cerebral excitement and congestion, but also to overcome the general tubercular diathesis.

The hygienic rules for obviating the strumous diathesis it is not necessary for me to detail at any length. These have been more accurately ascertained and better known since the writings of Sir James Clark, Dr. M. Hall, Dr. Todd, Dr. Coombe, and others; but they are still far from having met with that attention which they deserve. The importance of attending to the state of the digestive functions cannot be exaggerated; nor can the influence of that condition of system, which has been well termed "strumous dyspepsia," in leading to the establishment of scrofulous disease, be overrated. In those children who, from hereditary constitution, or from the peculiar circumstances in which they are placed, must be considered predisposed to Hydrocephalus, symptoms indicative of a deranged and depraved state of the digestive

functions occur much earlier than is often supposed; for, though to an attentive observer these symptoms are sufficiently manifest, as some considerable time may elapse before they are associated with any febrile disturbance, much diminution of the appetite, or interruption of the usual spirits and activity of the child, they are frequently either unnoticed or disregarded. The appetite, indeed, is often ravenous; the child is never satisfied; and, if it be still at the breast, the mother's health may be more obviously impaired than that of her babe, from the constant demands which it makes on her for nourishment. There may be no diarrhoea, nor apparently any constipation.

But the evacuations are unhealthy, light-coloured, greenish, mucous, yeasty, offensive, and often contain much of the food unchanged. The state of the tongue, however, frequently misleads: it may not be furred or much coated; but it is redder than natural, and dark red points stud the tip and sides, and protrude through any mucous coating that may exist. Ere long, however, there is evidence of impaired nutrition and of an irritable state of the nervous system. The skin becomes loose, and the flesh soft and flabby; the countenance loses its colour, becomes sallow and sunken. The child is fretful, irritable, and passionate; or else loses its spirits, and is dull and inanimate. The symptoms of deranged digestive functions now become more obvious, and are at-

tended by a degree of febrile action ; till at length this state of things merges into an attack of gastric remittent fever, or Hydrocephalus, or some other distinct disease supervenes. But these symptoms are often relieved, or removed, for a while, and only increase, or return, from time to time ; and, if the child thus escape the various dangers with which infancy and childhood are beset, as it grows up it becomes the subject of other forms of scrofulous disease.

The first grand object of attention when a child exhibits the state of system described above, is the regulation of the digestive functions. Too much attention cannot be paid to the state of the bowels and liver. But their functions are not to be regulated simply by giving purgatives ; and full purging with violent and acrid medicines must be carefully avoided. The extent to which purgatives are carried, the particular kinds to be employed, and the mode in which they are given, must depend on the degree of constipation, the character of the evacuations, and the amount of irritation of the mucous membrane ; and should not, therefore, be left to the determination of the parents or the nurse. Due regulation of the bowels may to many parents appear a very simple thing, and not to require the aid of a physician : but, in the present cases, it is far from being either simple or easy to accomplish ; and the public have yet to learn the full extent of the important relation in which

constant, assiduous, and skilful regulation of the digestive functions stands to the future health and welfare, and even life, of strumous and delicate children. The *fons et origo* of numberless forms of scrofulous disorders are readily admitted to be seated in the digestive organs, when a corresponding attention to the all-important maxim, *Principiis obsta*, is too often neglected. The full amount of advancement that has been made in medical science will not be seen, till the public are more generally convinced, that the skill and attention, as well as the fees of their physicians, are often more profitably bestowed in warding off distant danger than in removing existing ills.

In general, it is requisite to commence the treatment with an antiphlogistic diet and regimen; though it is seldom that blood-letting, in any form, is necessary. But if there be distinct fulness or tenderness of the hypochondria, a red tongue and febrile disturbance, a few leeches to the right hypochondrium may be useful in assisting to unload the hepatic system. A few grains of hydr. c. creta, with a little carbonate of soda, at bed-time, and succeeded on the following morning by a dose of castor-oil, or of an electuary consisting of rhubarb, supertartrate of potash and senna confection, may then be given, two or three times a week, when the bowels are sluggish. If they be loose, the mercury may be associated with Dover's powder; and a little rhubarb and soda, or sometimes rhubarb

and the compound chalk-powder, given two or three times a day. The state of the skin often points to the propriety of exciting its secretory functions by means of some diaphoretic; but I doubt the propriety, in most instances, of giving antimonial preparations. Ipecacuanha, sp. æth. nitr., or sp. Mindereri will generally answer the purpose better. But the tepid bath, or sponging with salt and water, and friction of the skin, are the best means of regulating its functions.

As soon as possible after the chief objects sought for by the above means have been gained, the diet should be improved, and tonic remedies and regimen employed. The food should be nutritious; not stimulant, nor bulky. Animal food may, in most cases, be allowed twice a day, and rice with other farinaceous articles should replace potatoes and other vegetables. Certain kinds of ripe fruits, in moderate quantities, need not always be forbidden. Indeed, I think I have found them sometimes decidedly useful. Grapes and oranges are the best. The "*cure des raisins*" in scrofulous affections is well known to have acquired much celebrity in Switzerland.

Of tonic medicines, the mineral acids, iron, and iodine, are the most efficient. It is often desirable to commence with the mineral acids in some bitter infusion. Iodine and the chalybeates have, in different cases, their respective merits. When the strumous cachexia is associated with a phlegmatic

temperament, a bloated countenance, and a gross habit of body, if the state of the mucous membrane does not contra-indicate it, iodine in small doses is often of great service. The beneficial effects of iodine and its compounds in the various forms of scrofulous disease in children are indisputable; but they should always be administered with caution, and never for a long time together without some intermission. Their effects on the digestive organs should be carefully watched. I shall not venture to offer any explanation of the mode in which iodine acts in these cases, whether as a tonic, as an alterative, or, as some think, more specifically on the liver. The latter opinion certainly explains most satisfactorily much of the benefit derived.

The chalybeates are best suited to those cases in which the temperament is more nervous, and where the face is pale and ex-sanguineous. Among the children of the poor in London, who are often suffering from the combined effects of want of pure air and due nourishment, iron is decidedly the best tonic we possess, when tonics are admissible; but any degree of febrile action more decidedly contra-indicates iron than iodine.

Abundant exposure to the open air, and moderate exercise, are, however, the most important tonics. But, after all that has been said on these subjects, much ignorance still prevails. The delicacy and irritability of the mucous membranes, and of the cuta-

neous surface of strumous children, and their feeble powers of resisting the sedative influence of cold, render it absolutely necessary that they should be well protected by warm clothing. There is not a more pernicious error than to imagine that a delicate child is to be "hardened" by exposure to all weathers without sufficient clothing. The kind and quantity of clothing must be adequate to enable the body to resist the depressing influence of cold on the circulation, and to protect it from any long-continued sensation of cold; and, therefore, the dress ought to be varied according to the state of the weather, and the powers of the constitution. If a child be shivering with cold all the time it is out, exposure to the air, so far from proving a powerful tonic, will be the most certain mode of still further enfeebling the constitution, and exciting disease. If a child be of an active disposition, and able to take a considerable amount of exercise when in the open air, it will require less clothing than in opposite circumstances; for, exercise is not less important than clothing, for the maintenance of a due and equable temperature. Children, therefore, should be encouraged to join in those games that entail exercise of the body while they are out of doors. If due attention be paid to see that they do not over-fatigue themselves, and that their circulation is well maintained, they can hardly be too much in the open air; for it should not be forgotten that exposure to light, as well as to air, is important.

An hour, or an hour and a-half, is by no means a sufficient time for out-door exercise ; though, from the obstinacy, ignorance, and prejudice of too many that have the charge of girls at school, this is unfortunately all they can obtain : and even the eyes of their parents are not opened to the injury that is being inflicted on the constitutions of their children, till they return home with lank forms, faded looks, and crooked spines, or consumptive coughs, the miserable victims of melancholy ignorance, or wilful opposition to nature's laws.

Salt-water bathing, where it can be had, is one of the best means of invigorating the system. When the circumstances do not admit of this, cold sponging with salt and water, or the shower-bath, are good substitutes. If there be much tendency to cutaneous eruptions, the warm-bath, or the vapour-bath, will be found of great benefit. These are also the best means of allaying temporary febrile disturbance, or nervous excitement, in irritable and excitable children.

The ventilation, the temperature, and the lighting of both the day and night apartments occupied by children, are of the utmost moment. The bed-clothing, as well as the bed-room itself, should be well aired during the forenoon, by flinging open the windows, and spreading abroad the clothes. An hour or two after noon, the windows should be again shut, and, if the weather be cold, a fire should be lighted for two or three hours, in order to raise the temperature

of the room to a proper standard before the children retire to rest. Equal pains should be taken, whilst the children are out, to ventilate the day-nursery, which should be a lofty well-lighted room.

The well-known injurious influence, on scrofulous constitutions, of a damp, moist climate, renders it highly desirable that the first years of life should be passed in a warm and dry locality. The neighbourhood of the sea-side is generally to be preferred. If the parents have already lost one or more children by Hydrocephalus, a favourable situation should be selected for rearing any future children; and if the mother be herself of a strumous habit, or weakly constitution, she should consider it a duty to forego the delight of nursing her own child, and select a young, vigorous, and healthy wet-nurse, having a good supply of milk.

However obscure the real nature, and, in most instances, the exciting causes of Hydrocephalus may be considered, we cannot calmly reflect on what is already known of its history and pathology, without feeling that at least something may be done, by such means as these, towards warding off the malady from those children who, from their family history, bodily constitution, or previous ailments, may justly be considered prone to Hydrocephalus. This conviction I have long entertained; and it is one which, I think, must be felt by all who have seen much of the diseases of children.

But the due regulation of the *mind*, and constant

attention to the *functions of the brain*, are as important, in a prophylactic point of view, as attention to other functions of the body, and, if possible, call for the exercise of still more watchfulness and judgment on the part of the parents. The predisposition to Hydrocephalus, as indicated by the mind, is often manifested from the earliest infancy, though generally it is either overlooked, or does not receive that attention which it imperatively demands. Nay,—frequently many of the indications of this predisposition, from being associated with sprightliness and general precocity of intellect, instead of being viewed as solemn warnings, are fondly cherished by the vanity of parents, or the imprudence of those to whom the education of the child is committed.

The education of the mind must be conducted in conformity with the powers and functions of the brain, and in obedience to organic laws. We have seen that the organization of the brain is in a transition state, up to the seventh or eighth year. Till this period it is delicate, immature, and feeble; its powers soon exhausted, and its functions readily deranged. Any arterial excitement, on the one hand, or a deficient supply of duly oxygenated blood, on the other, is sure to be followed by derangement of the cerebral functions in children, and of a more striking character than that which ensues on the same causes in adults. Errors of diet, derangement in the secretion of milk, from mental or other causes operating on the mother, an overheated

or close room, are soon followed by symptoms indicative of the influence that has been exerted on the brain and nervous system of children. And shall the undue action of the special functions of the brain be unattended by danger? Is not the exercise of the cerebral functions attended by the same organic changes as those which ensue on the functional activity of any other organ?

But it is not all exercise of the brain in children that is to be deprecated; for observation teaches us that great activity of brain is natural in childhood. It is rather the continuous exercise on particular subjects, especially such as call into action those powers which were not intended to be developed till a later period, or such as entail great excitement, that prove injurious. It is when the brain is exercised at the expense of other organs, when its powers are strained, when it is kept in a continual state of excitement and irritation, that the greatest danger exists. "Dangerous forms of scrofulous disease among children," says Dr. Brigham, "have repeatedly fallen under my observation, for which I could not account in any other way than by supposing that the brain had been exercised at the expense of other parts of the system, and at a time of life when nature is endeavouring to perfect all the organs of the body; and, after the disease commenced, I have seen with grief the influence of the same cause in retarding or preventing recovery. I have seen seve-

ral affecting and melancholy instances of children, five or six years of age, lingering a while with diseases from which those less gifted readily recover, and at last dying, notwithstanding the utmost efforts to restore them. During their sickness they constantly manifested a passion for books and mental excitement, and were admired for the maturity of their minds. The chance for the recovery of such precocious children is, in my opinion, small when attacked by disease; and several medical men have informed me, that their own observations had led them to form the same opinion, and have remarked, that, in two cases of sickness, if one of the patients was a child of superior and highly cultivated mental powers, and the other one equally sick, but whose mind had not been excited by study, they should feel less confident of the recovery of the former than of the latter. This mental precocity results from an unnatural developement of one organ of the body at the expense of the constitution." *

Whatever be the nature of the ailment that such precocious children labour under, the state of their brain demands constant attention. But, whenever they complain of any symptoms referable to the brain, the utmost quietude should be enjoined; the room should be darkened; their

* Remarks on the Influence of Mental Cultivation and Mental Excitement upon Health. By Amariah Brigham, M.D., Boston, 1833, page 45.

books and studies should be abandoned, and, generally speaking, after exhibiting some purgative, a sedative should be given. By such means the nervous system may be quieted, and the threatened danger averted at the onset.

Many scrofulous children, however, are endowed with a torpid inactive constitution of brain, and a consequent sluggishness and hebetude of mind that requires to be constantly roused and stimulated to action. The influence of this state of mind on the corporeal functions, and even on the nutrition of the brain itself, though less marked and of a different kind, is not less decidedly injurious than the opposite. A certain degree of activity of mind is absolutely requisite to the due performance of the nutritive and all other functions of the body. Children of this torpid constitution of brain are indisposed to play, or to exert the body in any manner; and the danger is thus increased. They require the stimulus of society, of active games, and of abundance of fresh air and bodily exercise, as well as of mental occupation, to ensure the requisite degree of nervous energy. Long-continued confinement in heated rooms, and its necessary consequence, —deficiency in the supply of duly oxygenated blood, —are peculiarly prejudicial to such children.

But, in the present day, the tendency is to over-stimulate and over-work the brains of children: it is the fashion to boast of the improvement in the education of children, and to vaunt of

the extent to which the intellect may be developed in the earliest periods of life. It would be well, however, if the benevolent but mistaken friends of youth would reflect more seriously on the danger and cruelty of many of the schemes for cultivating the mind at the expense of the frail body to which it is united. We are bound to inquire whether these schemes are in conformity with organic laws, and to remember that these laws cannot, with impunity, be infringed.

It is, indeed, a beauteous sight,—one of the most lovely which this earth affords,—to view the growth of the immortal mind, the expansion of its powers under the influence of right moral and intellectual culture, and to watch their exercise in the still feeble and delicate body of a child. But lamentable and fatal is the mistake to attempt the cultivation of the intellect, ere yet the soil which is to support it has been prepared. We may plant the oak in a china vase fit only for the reception of delicate flowers, and for a while it will flourish; but, as the roots of the strong tree expand, the fair vase is shivered! *

In how many instances are medical men called to lament the deplorable ignorance and infatuation that still prevail, respecting the true principles on which both intellectual and physical education should be conducted!

Great praise is due to those members of the

* Goethe.

profession, who, endowed with the requisite abilities and acquirements, and placed in stations of influence, have with a noble philanthropy exerted their energies to diffuse through all ranks of society that knowledge which

*Æquè pauperibus prodest, locupletibus æquè ;
Æquè neglectum pueris senibusque nocebit ;**

and which, in power to promote the happiness and welfare of mankind, ranks next to that whose origin is Divine.

Long may the profession of medicine stand thus distinguished for its philanthropy, and ever may its members continue to vie with each other in their struggles for its noblest and most enduring honours ; aspiring, amidst all their difficulties, toils, and anxieties, for the highest of all recompense—the consciousness of having diminished the suffering and augmented the happiness of mankind !

* Horatii Epist. i.

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ILLUSTRATIVE CASES

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APPENDIX

OF

ILLUSTRATIVE CASES.

THE following cases are intended to illustrate some of the views advocated in the preceding pages. I have refrained from detailing instances in which the common results of inflammation and softening of the central parts of the brain were the only morbid appearances, or in the treatment of which merely the ordinary practice was pursued; for there is an abundance of such cases already on record.

CASE I.

Illustrative of the Simple or Nervous Variety.—No Inflammatory marks within the Head.—Tubercles in the Chest and Abdomen.

— Stapleton, rather a thin, delicate-looking girl, with light hair and eyes, three years ten months old, had the measles about three months ago; since which she has not been thoroughly well. On Sunday last, August 29th, was observed to be fretful and drooping: the following day, vomited frequently, and complained of her belly. By the advice of

a medical man purgative medicine was given, which operated but very imperfectly; she continued to complain of her belly and to be constipated, and was thought to be the subject of some inflammatory affection of the abdomen. On my seeing her, September 4th, I found her lying on her side in bed, with the knees drawn up to the belly, and frequently putting her hand to her forehead, and scratching her head. She was brought near the window on her mother's knee. Conjunctivæ a little suffused. Pupils alternately contracting and dilating; then fixed, for a moment or two, with a vacant look: light does not seem much to incommode her. She is very fretful, and cries if moved or disturbed in any way. Countenance a little flushed and anxious; tongue tolerably clean, rather white in the centre; lips parched and cracked; occasional knitting of the brows. Pulse 96 to 100, irregular and intermitting; skin dry, not hot, though warm; abdomen not distended; child cries when it is pressed, which, however, seems to depend on general sensitiveness, and dislike to be touched; renal secretion very scanty, its character could not be ascertained; bowels confined, one slight dark evacuation yesterday; vomited yesterday; craves for food, but not for drink. No increased heat of scalp; fontanelles closed; frequent squinting with both eyes since yesterday; starts often in sleep; no screaming, but moans much; disposed to doze a good deal, and takes little or no notice of what is passing.

Three leeches to the temples, hair to be cut short, and a tepid lotion applied to the head occasionally. R hydr. chlor. gr. v. sacch. albi gr. iij. M. f. pulv. statim, post hor. iij, et mane sumendus.

September 5th.—Leeches bled tolerably well; bowels have acted pretty freely, motions a dark green; little or no secretion from the kidneys. A fit of screaming after the application of the leeches; then slept for several hours,

woke, and asked for food. Pulse 120; smaller than yesterday, but more regular: more stupor: cries whenever touched or disturbed; but soon languidly closes its eyes, and relapses into a state of stupor. Pupils unequally dilated; but contracting readily on the admission of light, which does not seem much to annoy the child; abdomen rather sunken. Injic^r. enema cath. stat. Applic^r. emp. lyttæ nuchæ. R hydr. chlor. gr. viij. iodinii gr. j. sacch. albi gr. lxxx. M. f. pulv. in partes xvj. æquales dividendus. Sumat j. 2^{ds}. horis.

Evening.—Much the same. Vomited once. Enema brought away very little from the bowels: repeat it.

6th.—More stupor; pulse 130, tolerably regular; skin very dry and harsh; pupils somewhat dilated, but contracting, though unequally, on exposure to light. Cries only when disturbed, but moans and sighs frequently; respiration irregular; vomited once; evacuations pitchy; abdomen flat; lies with the knees drawn up; feet rather cold. Repet^r. enema cath. et pulv. et illin. ung. hydr. fort. nocte manequæ. Applic^r. emp. lyttæ cruribus.

7th.—Almost constant stupor, but easily roused; pulse very quick and feeble; extremities cold; pupils widely dilated; spasmodic rigidity of the limbs whenever she is moved. Strabismus convergens of the left eye. Evacuations of the same appearance. To have some simple jelly and broth, and a little wine. Repet^r. pulv. et enema cath. R sp. am. arom. sp. lav. comp. āā ʒij. tinct^æ. scillæ ʒj. mist. camph. ʒiij. ss. Sumat ʒj. 3 horis.

8th.—Much the same. Spasmodic rigidity of neck and limbs; conjunctivæ injected; pulse intermitting, irregular, and very rapid; alternate flushing and pallor of the cheeks; picking at the lips and nares, which are dry and cracked; feet often cold. Continue as before.

9th.—Skin hotter; and pulse of more force and regularity,

but still very rapid,—above 150. Repeat powders, ointment, and blisters to the legs. To have a table-spoonful of wine occasionally.

10th.—Died early this morning, with stertorous breathing.

Necropsy, thirty-six hours after death.—Eyes sunken, and dark areolæ round them; abdomen tympanitic: a good deal of emaciation. Skull rather thin, particularly at certain spots, where it is diaphanous; of a blue colour throughout. Dura mater healthy; rather more adherent than usual along the longitudinal sinus, which is empty. Arachnoid rather dry, and somewhat opaque. Large vessels of the pia mater somewhat congested with dark fluid blood, but the general appearance of the cerebral hemispheres pale. 3j. ss. to 3ij. clear serum in the ventricles, which are a little distended. The lining membrane healthy, smooth, and glistening; choroid plexus pale. Substance of the brain around the ventricles whiter than usual. All the central parts, and cerebral substance throughout, remarkably firm and white. About 3j. of fluid at the base of the brain, but no other effusion. Arachnoid here smooth and polished, without a trace of morbid deposit. The contents of the skull were very carefully examined, and nothing abnormal detected, but effusion into the ventricles. The blood generally was dark and fluid.

Miliary tubercles scattered through the lungs, abundant in the upper lobes: numerous patches of tubercular deposition beneath the costal and diaphragmatic pleura on the right side, and a few on the left. Bronchial glands contain large masses of soft greenish tubercular matter.

Numerous miliary tubercles beneath the serous covering, and scattered through the substance of the spleen. Liver large, extending beyond the false ribs; pale, with some straw-coloured patches on the surface, but containing no tubercles.

Mesenteric glands slightly tuberculated. Kidneys and peritoneum healthy. Alimentary canal not opened.

CASE II.

Illustrating the Low, Nervous form of Hydrocephalus, coming on during teething; treated without bleeding.— Recovery.

Elizabeth S. M., æt. one year and ten months; teething. The history of the case previous to my seeing the child was briefly as follows:—A month ago she had a fit of screaming, became very fretful, constantly laying her head down, and looking dull about the eyes; the bowels were then regular, and, opening medicine being given, acted well: but she became feverish, complaining of thirst, with anorexia; had a convulsive fit, followed by contraction of the right leg and stupor, that lasted for several hours. At the recommendation of the family medical attendant, leeches were applied to the head, and subsequently a blister. The tendency to stupor and the screaming diminished, but she lay in a listless state, with occasional fits of insensibility, and vacant staring. The bowels, from having been rather loose, became constipated; and much rolling of the head, and screaming, returned. Considerable emaciation has taken place, and, for the last three or four days, the child has had no sleep, but has rolled her head perpetually, biting occasionally at any thing that comes in her way, craving for food, but not swallowing any, and having frequent convulsive contractions of the limbs.

December 1, I first saw the child. She was then much

emaciated, of puny form, and pale sickly aspect; the brows contracted, pupils dilated and fixed, with a vacant stare. The temperature of the head was scarcely above the natural standard, the fontanelles almost closed. The pulse could not be felt at the wrist, and but imperfectly over the carotids. The skin was dry and parched, the tongue covered with a thick dirty fur in the centre, and the bowels had been confined for the last three days. The abdomen neither prominent nor retracted. She was either tossing about, or flinging the head and shoulders back, from spasmodic contraction of the muscles: the hands she was perpetually putting to her mouth or to the head, moaning and whining, or screaming violently; now and then lying with a vacant look, and taking no notice of any thing.

As the gums were rather full, they were freely lanced; the child being thrown by the operation into a state of stupor, with the eyes fixed and hands clenched, with the thumbs turned in on the palms.

Sumat hydrarg. chloridi gr. v. statim. Applic^r. emp. lyttæ nuchæ.

R hydr. chloridi gr. viij. iodinii gr. j. M. et tere bene simul et postea adde sacchari albi gr. lxxx. M. et divide in partes xvj. æquales. Sumat j. 4tâ quâque horâ.

The child was placed in the warm-bath, the hair cut short, and the forehead and vertex sponged frequently with tepid vinegar and water.

December 2nd.—The calomel has acted twice, but imperfectly: the first motion much confined; the second more loose, but clay-coloured, and very offensive. She has slept a little, for the first time, for several days; rather less screaming; appears occasionally to recognise the mother. Tongue cleaner; has passed some high-coloured urine. The pupils are still dilated and fixed. The blister was not applied till this morning.

December 3rd.—Blister has risen well; bowels moved twice, motions darker and not so offensive; has passed but little urine, which is high-coloured. Face presents a rather more natural expression, and has more colour. Pupils still dilated. Tongue covered with a dirty fur in the centre, but cleaner at the tip and edges. Pulse small, feeble, quick, and irregular; could not be satisfactorily counted. Has vomited twice; but there has been no screaming, and less whining and moaning, nor has there been any convulsive motions or flinging back of the head. Sumat ol. ricini ʒij. mane. Repet^r. pulveres. To have a little broth with barley jelly, and milk and water for drink.

4th.—Has slept a little, and is in all respects better. Bowels moved twice by the castor-oil. Pupils less dilated, and she appears occasionally to recognise those about her. The breath has that peculiar sickly smell so often noticed in Hydrocephalus. Repet^r. pulveres et ol. ricini.

6th.—Two evacuations, from the oil yesterday morning, more loose and of a yellow colour. Has taken her broth, and slept last night from eleven to five o'clock. Bowels not moved since yesterday morning: has had two or three fits of screaming this morning, but is generally much more quiet. The pupils contract slightly on exposure to light. Breath less sickly, and tongue cleaning. Repet^r. pulveres et ol. ricini. The blister, which is slightly ulcerated, to be dressed with bread-poultice made with poppy fomentation.

7th.—The oil has not acted; more restlessness and screaming, and more disturbed by noise, starting at the slightest sound. Sumat hydr. chloridi gr. v. statim. Repet^r. pulv. Directions were given to exclude all light and noise from the apartment as much as possible.

9th.—In every respect better since the last report.

13th.—Passed a restless night on the 11th, screaming

and staring wildly, and the bowels were again much constipated. The whole of the 12th she was worse, and had several attacks of convulsions. The calomel was repeated, and acted well on the bowels; and to-day she is quieter, and altogether better. Blister still sore. Pulse 100, of better strength, but irregular. The pupils act well, and the expression of countenance much more natural. Slept tolerably well last night. Some strophulous papules on the shoulders. The powders to be taken twice a-day.

15th.—The sore from the blister healing, tongue cleaning: sleeps well, and is much less restless. Takes beef-tea and jelly. R infus. gentianæ ʒij.ss. potassæ hydriodatis gr. vj. syrupi papav. albi ʒij. M. Sumat ʒss. ter die.

17th.—Very much improved. Pergat.

20th.—Blister healing fast. Sleeps and takes nourishment well. All the head symptoms have disappeared.

From the last report the improvement was progressive and uninterrupted; and the child, which was emaciated to an extreme degree, rapidly gained flesh and strength.

May 5th. — The little patient I scarcely recognised again. She runs about in perfect health and strength, and exhibits no traces of her previous severe illness.

There could be no doubt that this child, when first she came under my care, was the subject of very serious cerebral disease; and neither my friend Mr. Ebr. Smith of Billiter-square, who also saw the case, nor myself, had any expectation that it would terminate so favourably.

CASE III.

Illustrative of the Low or Nervous form, with very trifling and doubtful inflammatory marks in the membranes of the brain.

A girl, four years of age, about sixteen months previous to the present illness had whooping-cough, since which she has been more or less ailing. On Tuesday, 11th August, she was seized with vomiting, and became restless and fretful. By the advice of a physician, a few leeches were applied to the head, and some other remedies employed. The child gradually fell into a listless state, with frequent flushing of the face, occasional sickness, and confined bowels.

On 20th August she came under my care, when she was much emaciated; the pupils rather dilated, and fixed, face flushed, head very hot; pulse 150, of tolerable strength; tongue coated, lips parched. She lay in a state of stupor, except at intervals of a few minutes, when she seemed to recognise her mother. Takes scarcely anything, has had no convulsions, and but rarely gives any evidence of being in pain. Head to be shaved, and cold applied; four leeches to the temples, blister to the nape of the neck. Enema cath.; calomel and antimony, every three hours.

21st. — Much the same, but pulse rather weaker: does not swallow the powders; head still very hot. Cold douche: repet. enema.

22nd. — Coma more decided. Died in the evening without any convulsion.

24th. — *Necropsy*. — Head alone examined. Membranes much congested; some effusion beneath the arachnoid, and

about two ounces in the ventricles. Neither softening, nor evidence of inflammatory action in any part of the substance of the brain. A good deal of serous fluid at the base, and the roots of the nerves glued together by a pale, straw-coloured, semi-coagulated, albuminous fluid.

CASE IV.

Cerebral Disease supervening on the subsidence of Simple Gastric Fever, and illustrating the beneficial effects of Opium.—Recovery.

Elizabeth Manning, æt. one year and nine months; a small delicate child, of healthy parents.

Nov. 5th. — When first seen, the child had been ill for two or three days, and was suffering from symptoms of simple gastric fever; I therefore prescribed a rhubarb and calomel purge, and a saline mixture, with small doses of *vinum ipecacuanhæ*. The fever gradually subsided, and she was going on well till the

12th,—when the following was her state: For the last two or three days she had had no sleep; the bowels were irregular, and the motions offensive; the abdomen a little hotter than natural, but the feet cold; the temperature of the head rather above the natural standard; the face shrunk and expressive of pain, and the pupils somewhat dilated. Pulse 100, rather weak; tongue furred and covered in the centre with a dirty creamy coat, dry at the edges; lips parched, and tenacious mucus adhering to the mucous membrane and to the teeth. She is almost constantly moaning, but now and then shrieking; the head is continually rolled

about from side to side, and her restlessness is extreme. She takes neither food nor drink. The whole appearance is that of the early stage of the low or strumous form of Hydrocephalus. She was ordered to be placed in a warm-bath, and to take ʒij. of ol. ricini. R. pulv. ipecac. co. gr. ij. pulv. rhei gr. ij. M. f. pulv. bis in die sumendus.

14th.—Slept a little on the night of the 12th. Bowels moved twice yesterday; the motions very offensive, but of natural colour: less moaning and screaming, and general appearance improved. Pulse 100: mouth less parched. To continue the Dover's powder, and to have a little beef-tea, and ʒij. ol. ricini in the morning.

16th.—More tossing of the head, and rolling of the body; tongue parched; bowels open; pupils dilated; fore-arms flexed and rigid, with the hands clenched. Takes no nourishment. R. hydr. chloridi gr. viij. iodinii gr. j., tere bene simul et adde sacchari albi gr. lxxx. M. R. pulv. supra præscripti gr. v. pulv. ipecac. co. gr. ij. M. f. pulv. 6tis horis sumendus. Warm-bath, and ʒij. olei ricini in the morning.

17th.—No sleep; perpetual moaning and tossing of the head, with occasional vomiting. In other respects symptoms much the same. The powders to be taken every four hours, and the warm-bath to be repeated.

18th.—Has had nearly six hours' almost uninterrupted sleep, for the first time, since the commencement of her illness. Has vomited twice, but has taken and retained some beef-tea. Pulse 108, of better strength; skin warm; recognises the parents. Pergat.

19th.—Has slept a little at intervals; much less rolling of the head; vomited once last night after the powder; two motions, dark and offensive. Has taken a cup full of beef-tea. Pergat.

20th.—Slept well; tongue cleaner; bowels open; all

rolling of the head, screaming, and contractions of the arms have ceased. Appetite returning.

23rd.—The child has continued to improve, having taken the powders night and morning. It still, however, sleeps but little ; the appetite is good ; all the head symptoms have disappeared, and the countenance has assumed an intelligent, cheerful aspect.

Dec. 5th.—The child has quite recovered its health, and is gaining flesh.

THE END.

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GUY'S HOSPITAL

REPORTS.

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Bennett, James Risdon,

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Water in the Head A Prize Essay, to which the medical society of London
awarded the Fothergillian gold medal for 1842

London 1843

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